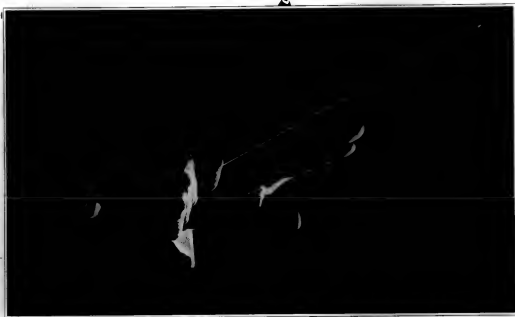


IBM Client/Server



IBM is a registered trademark of International Business Machines Corporation. © 1993 IBM Corp.

How do you get everyone working in concert?

To stay competitive, you're constantly searching for better ways to orchestrate the flow of information. How do you get more out of your PCs? How can you make the most of your existing systems? What can be done to streamline your organization? More often than not, the answer is IBM Client/Server.

IBM can develop open client/server solutions that put the combined strength of all

your computer systems to work for you. We have thousands of specialists worldwide who can work with you to custom-tailor a solution that's right for your particular business. And we'll work with you at any stage of the process, from initial consulting to helping you tie everything together—we'll even manage your systems for you.

Whether you're upsizing or downsizing, nobody knows how to ensure systems reliability and security for your "mission critical" applications better than IBM.

We can also help you integrate different types of hardware, software and networks. We have the industry's widest array of software and network products, and we support Distributed Computing Environment (DCE), enabling different computer brands and platforms to work together in harmony.

For more and more companies, IBM Client/Server is the key to getting everyone working in concert. We've done it for hundreds of companies. We can do it for you. For more information, call 1 800 IBM-0045, ext. 10.

There's never been a better time to do business with





Accounting and sales
can't seem
to get in tune.

Marketing
is fiddling around
on their own.



And basically,
everyone seems to be marching to their own drummer.

Sound familiar?

Hitching a ride on the glacier

called up one of my favorite IS gurus recently and caught him going live with his new client/server operation — the culmination of a carefully orchestrated two-year rollout. His usual relaxed Southern charm was worn to a fricassee.

"I've had four hours' sleep in the last three days," the manager growled, as he ticked off a verbal list of unceremonious things-gone-wrong.

Understand, now: This man is an open systems, distributed computing, client/server believer. He chose his vendors carefully, benchmarked hardware 'til it squeaked and extracted every written guarantee he could dream up from his software suppliers.

Still, there were jolting and distressing surprises. Like the database vendor that blithely broke his vow to continue supporting the Cobol interface on his company's Unix variant.

Despite such bumps in the road, however, this manufacturing company remains committed to client/server, confident that the change will quicken its responsiveness to customers, streamline internal business processes and improve overall communication.

If such a mixture of frustration and faith sounds familiar, then welcome to the premier issue of *Computersworld Client/Server Journal*, a reality-based, write-and-all exploration of these new technologies at work in your businesses.

Computersworld Client/Server Journal will focus exclusively on the increasingly open and distributed nature of computing in the '90s. We will cover the topic from many vantage points, including system and network management, case studies of user companies, multivendor support issues, data security, applications development and more.

As many of *Computersworld's* readers know only too well, the move to client/server can be complex and cumbersome in some places and maddeningly immature in others. Yet no one talks about turning back or unlearning hard-won new skills. As the rewards start to roll in, they are simply too compelling to ignore.

"As an industry, we're still early on in the learning cycle. But I'm hearing some very good stories about client/server from some of our brokerage member firms," said Wayne Fowler, director of technology and network services at the Toronto Stock Exchange, which is already saving 20% annually on cost of operation from its client/server conversion.

"This is, quite simply, where the business is going," Fowler added. "Client/server is like a big glacier and you've got two choices: Plaster yourself up against the front and try to stop it. Or get on top and ride."




UNIVERSITY, page 17



SEASIDE, page 12



APPLICATIONS, page 33

12 High spirits at Seagram

The international beverage retailer makes a business case for its leading-edge multimedia document management system, which debuts this summer.

17 Showstoppers

War stories and advice from the user front lines on how to disarm the technical land mines that can bring down your client/server project.

21 The case for WAIS

The Internet's Wide-Area Information Server offers a promising model for information-sharing in the commercial world as well as the scientific and technical ones.

22 'Open' security: Resolving the paradox

Client/server designs promises easy access to reams of critical information, yet it can swing the door open to intruders as well.

27 Whoa! Network traffic ahead

Managers try to regain control of communications bandwidth as client/server applications gobble it up.

33 Decision time for applications

Choosing the right applications for client/server vs. host-based computing means factoring in everything from user demands to data requirements.

48 No trouble for Tribble

An interview with Sun Microsystems' "objects guru" Bud Tribble, who says the programmer learning curve and immature tools are slowing acceptance of object-oriented technologies.

WHAT WE TALK ABOUT

Perspectives

A quarterly compendium of industry events, opinions, research findings and more on client/server issues.

Page 5

Exclusive user survey

As more client/server apps roll into production use, our survey of IS professionals shows networking is still the No. 1 hassle.

Page 8

User viewpoints

Top IS execs at Hyatt Hotels and John Hancock offer some advice and observations on moving to new environments.

Page 11

The C.S.I. product review

Users put C.S.I.'s Unix Tuxedo transaction processing monitor through its paces and find some room for improvement.

Page 40

CLIENT/SERVER

CONTRIBUTING WRITERS

Johanna Ambrosio

Charles Babcock

David Baum

James Daly

David A. Kelly

Starline McCann

Michael L. Sullivan-Trauer

Joanne M. Weiler

CONTRIBUTING COLUMNISTS

Shirley Ann
Rex Associates, Inc.

Jerrold Grochow
American Management Systems, Inc.

Judith Hurwitz
Hurwitz Consulting Group

Gordon Kerr
Kerr-Harris Corp.

Diane Symgel
Data Research

DOPT EDITORS

Steven J. Gordon

Stephen P. Klett

Christine Accord Maguire

Bill Zokot

Ellen Farthing

Managing your data

Implementing your business strategy

Managing your workflow

Managing your human resources

Changes in organizational structure

Re-engineering business processes

Integrating legacy applications

And maybe most important:



When Bob Epstein, Executive Vice President and a founder of Sybase, talks about computing and business, people listen. After years of developing client/server products and talking with customers, he's seen what works, and what doesn't. Hear what he has to say in a remarkably candid recorded conversation. For your copy of "Client/Server And The New Organization," call 1-800-SYBASE-1.

Outside the U.S., call (408) 224-8044. © 1993 Sybase, Inc.

 SYBASE®





That's Berl Hartman, Vice President of Product Marketing. She's spent much of her career engineering and developing products that help customers get data into users' hands. In a remarkably candid conversation, she shares her experience and offers some valuable advice. For your own copy of the tape *"Distributing Data In The Client/Server Enterprise,"* call 1-800-SYBASE-1.

PC/WORKSTATIONS: UPSIZING

- **RESOURCE-CENTRIC:** Applications run on workstations with direct access to the data. **EXAMPLE:** A hospital with a relational database on the LAN and workstations clients tapping directly into the server.
- **DISTRIBUTED:** Application logic is split between front and back end, with data scattered on back-end servers. **EXAMPLE:** "Tether" information servers on the Internet.
- **DISTRIBUTED DATA:** Application is split between front and back end, with data "scattered" taken periodically and downloaded to local servers. **EXAMPLE:** Financial traders receiving data feeds.

MAINFRAMES: DOWNSIZING

- **Client-server:** No change to existing batch-and-mainframe applications or databases, but front-end applications adding new business logic, often through GUI presentation. **EXAMPLE:** Customer service center with a new GUI monitor for credit card operations.
- **DISTRIBUTED LOGIC:** Some mainframe work is off-loaded on application is split between front and back ends. Data is scattered on back end and optimized for performance and related innovations. **EXAMPLE:** Retail store operation.
- **DISSEMINATED DATA:** Data replicated from data "cloning" with application split between front and back end and majority of the work had handled on intermediate servers. **EXAMPLE:** Retail bank with customer-related data on back-end mainframes and daily download of replicated data to branch offices.

Client/server setup boosts underwriter productivity 25%

Cigna Property & Casualty Cos. in Philadelphia has turned to a company-wide set of client/server product standards to improve its competitiveness and empower a key group of users: the policy underwriters.

"With our new standardized property and casualty client/server system, we are making more visible business decisions because information is more readily available," said Arnold Herenstein, vice president of workstation and office technology. "We're pushing as much of the mystery out of technology as we can and just making it a tool for our underwriters."

The system has boosted underwriter productivity by 25% to 35%, he added, because the employees can work faster and more accurately. For example, the system's electronic forms cabinet, which stocks 25 off-used policy forms, has helped save time. "Now we don't have to stock 30,000 forms from every state. Employees can just look up the one they want, click on the screen and print it out," Herenstein said.

Adopting specific products as corporate standards has given Cigna "tremendous leverage with the people we buy from," Herenstein noted. It also eases a smoother rollout of newly developed applications to Cigna's enormous 30,000-plus employee user base, he added.

"Standardizing truly focuses our skills on the products we use and encourages a higher degree of interchangeability so that we can transfer a successful program to another division easily," the manager noted.

Cigna's standards guided the consolidation of 73 property and casualty marketing centers into six specialized processing centers serving

more than 4,000 users. The insurer chose IBM Personal System/2 Model 85-type servers, OS/2 2.0, Token Ring networks and IBM LAN Server 2.0 as standards. The underwriters use workstations running DOS 3.0, Windows 3.1, Microsoft Corp.'s Mail, Lotus Development Corp.'s 1-2-3, WordPerfect Corp.'s WordPerfect 5.1, Borland International, Inc.'s Paradox, Microsoft's Access and dBase for Windows. With these tools, Herenstein said they are well-equipped to respond to any customer request.

Even so, standards must be constantly re-evaluated. "Standards become impositions if they don't match the requirements of the business," he noted. One of the early screen development languages Cigna used, for example, was dumped in favor of PowerSoft Corp.'s PowerBuilder and Microsoft's Visual Basic. **CSJ**

TOOL WARS

Get ready to spend less on development tools during the next few years, says Forrester Research, Inc.'s "Software Spending Report." In an analysis of 20 early adopters of client/server desktop-based systems, the Boston-based consultancy predicted that today's \$5,000 tool will cost about \$2,500 by 1995. The desirable view, however, was that today's re-engineered tools won't all that powerful, and vendors are not adequately providing customer pay. Users don't lack a "robust development methodology" today. But as product offerings for 1995 will reach \$4,700 units, with 1996 still just out doors for 700,000 units, Forrester predicted. Perhaps 1,000 companies are expected to expand into new early life business processes. **E**

CONSULTANT'S VIEW

A different kind of spirit

Encouraging certain personality traits in your staffers can ease the upsurge of a client/server conversion



With any new technology, individual personalities and development team "chemistry" have more to do with its success or failure than most organizations realize. Many a company finds itself engaged by the technology aspects and pays very little attention to the staff implementing the new technology. Client/server is no exception.

Yet what are the fundamental differences in personnel characteristics in the client/server environment vs. the conventional host-based organization? How do you identify who among your "vintage" COBOL, VSAM and CICS programmers will "make it" over to client/server? Here are some of the traits to watch for:

1. A sense of urgency: The main concern of client/server is a short delivery schedule with use of many desktop tools. Some deliveries have to be provided in a six-month time frame, and once you reach a goal you must set another one. Programmers who have not met deadlines in the past will probably not make it in a client/server environment.

2. A willingness to forgo perfection: About 50% of almost every deliverable is finished in half the time; the remaining 50% takes an additional 50% of the time. If the programmer will not release the program to the tester for three months, the tester will not be able to test it in less than three months.

3. An inquisitive mind: Programmers should become familiar with numerous windows-based graphical user interfaces (GUI) applications to learn the characteristics of good and bad GUIs. The programmer will also acquire a greater understanding of when it is appropriate to use specific objects.

4. A taste for experimentation: The person should be open to using new technologies. When programmers are just learning to develop GUI applications, they should be given the leeway to explore the functionality of a front-end tool.

5. A certain team spirit: Any group of developers and programmers will learn functions and tasks at varying rates. The environment in a GUI project should be conducive to the interaction of ideas, so the individual must be open to information-sharing with peers. Two or three types of programmers are likely to work on a project: one with front-end GUI expertise, one with database skills and possibly a third who can access the mainframe for legacy data.

6. Respect toward users: Because most client/server implementations take place in user departments, programmers who think users are stupid will have a very hard time functioning in this new environment. **CIS**



David A. Kelly is a client/server consultant in West Newton, Mass.

Alte is president of Alte Associates, Inc., a consultancy in Port Chester, N.Y., that specializes in client/server technologies.



Traditionally,
when you bought something
from IBM, it came in a box.

PRODUCTION MODE

Are you testing any applications slated for production?

YES 54%
NO 46%

RESPONSE BASE: 104

Are you moving applications to production this year?

YES 72%
NO 28%

RESPONSE BASE: 104

Are you moving applications to production next year?

YES 62%
NO 38%

RESPONSE BASE: 68

More over, old technology. Most Client/Server Survey respondents are testing and moving more and more applications into production use and in 1994.

STUCK ON THE NETWORK

Are you having networking problems while moving to client/server?

YES 55%
NO 45%

RESPONSE BASE: 514

What kinds of networking problems are you having?

- 58%** have incompatibilities with their existing network.
- 46%** have network management difficulties.
- 28%** deal with bandwidth and throughput issues.
- 8%** have other network problems.

RESPONSE BASE: 50
(MULTIPLE RESPONSES ALLOWED)

HOW ARE YOU DEFINING CLIENT/SERVER?

RESPONSE BASE: 349



You're further along than you think

Our exclusive survey finds a majority of IS shops running some production applications under client/server

For those who doubt the progress of client/server computing, we have new evidence of its steady growth as a primary systems platform. *Computerworld's Client/Server Journal* survey reveals that a majority of the 218 information systems professionals polled run production applications in client/server environments.

One-third of the survey respondents consider client/server a key part of a broader company strategy, while 11% consider it more of a departmental project. Only 9% are still in the pilot stages.

Networking surfaced as a major

problem area for most of the users surveyed, with incompatibilities among existing networks representing the most significant headache, followed by network management and throughput issues.

The survey also showed that the level of client/server computing is more advanced than many experts believe.

One-third of the professionals defined their client/server efforts at the most advanced level: That is, user presentation and some business logic are on the client, while additional logic, data management and fully distributed systems are on the server.

Another 24% have some distributed applications on the server and the same business logic split as the first group, while 22% have all the logic and presentation on the client.

Only 19% are defining client/server as presentation on the client and everything else on the server—which is similar to traditional non-client/server computing models.

In addition to running production applications at a high level of client/server implementation, a large portion of the users are testing additional production applications to roll out this year or in 1994.

What is your level of client/server activity?

40% are building new applications in client/server.

34% are building new applications and migrating to client/server.

28% are migrating to client/server.

6% don't know.

RESPONSE BASE: 349

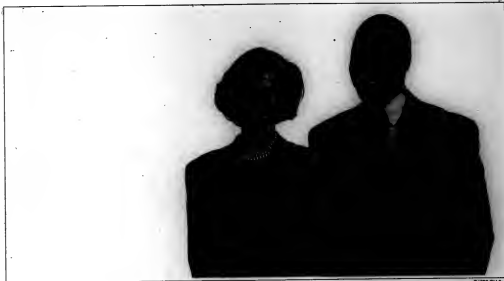
Despite their interest in client/server, the respondents cited object-oriented systems as their greatest technology interest. Electronic-mail-enabled applications, work-flow systems and systems management middleware—the more client/server-related technologies—were next on the list.

METHODOLOGY

The survey was conducted and tabulated by First Market Research, an independent telephone research firm in Austin, Texas. A random sample of 15 organizations were polled.

—by MICHAEL L. WOLFFORD-THORPE
Computerworld's research manager

IBM Services



© 1993 IBM Corp.

Now it comes in person.

It may surprise you to know that our most valuable product isn't a computer. It's a person. An expert who understands your business. Who has access to an astonishing array of resources. And who can act as a partner to make your business more productive and more competitive.

At IBM®, we can work with you at every level, from the CEO's office to the manufacturing floor, to develop business and information technology solutions that address the challenges facing your business.

We have management consultants to help you decide what to do. Systems consultants to show you how. Technical experts to do the job for you. Even an organization who'll run your systems for you.

No other company has such a breadth of experience gained from decades of work with all kinds of companies. No services company is so rooted in leading-edge technology such as client/server computing. And no one offers such a full spectrum of help—multivendor systems integration, network management, application development, data center operations, management education and user training, disaster recovery, availability services and more.

Wherever you are, we'll put together a solution tailored specifically to your business, just as we've done for other companies. We'll use whatever resources are needed to do the job, including non-IBM equipment if needed. What's more, we'll assume whatever level of responsibility for the results you specify.

For the Service Center nearest you and more information on how IBM can help you build competitive-edge solutions, call 1 800 IBM-0045, ext. 30.

There's never been a better time to do business with **IBM**.



Mark Page knows the situation well. Vice President of Connectivity Products at Sybase, he's helped a long list of customers develop integrated solutions to one of the most significant problems in client/server computing. He shares that experience in a taped conversation "Making Connections In Client/Server Computing." For your copy, call 1-800-SYBASE-1.

HYATT HOTELS: Sticking with simplicity

Experience in the art of science and technology shows us that the best designs are simple, elegant and effective. The information technology industry has too many examples of complex and complicated systems that fail the simple test of effectively solving a business problem.

If you want to be successful in developing client/server applications, you must define and follow an architecture that is simple to describe but solves your problems.

We at Hyatt Hotels Corp. faced an array of technology choices in 1988 when we began our conversion to the new hierarchy of open systems. We evaluated Application Systems/400 vs. Unix-based systems; traditional vs. relational databases; Oracle Corp. vs. Informix Corp.; C vs. fourth-generation language (4GL) programming — to name a few. Our final selection seemed almost too simple: Choosing Informix 4GL implied Unix, implying relational technology, while having Unix allowed more freedom in selecting hardware.

Keer is senior vice president of MIS at Hyatt Hotels Corp.



This five-year client/server journey sidestepped the knife-edge technologies and trimmed operating costs by up to 40%.

In the end, our technology selection was put to the test by benchmarking and pilot-testing the entire set of architecture choices. Hyatt created a test using the Informix 4GL to emulate a central reservation system, the most technically demanding application we face. That benchmark proved that the architecture hung together.

Yet decisions sometimes loop back on themselves, resurfacing in other guises years later. Our first two applications were developed using these architectural choices to create a number of sales and reporting systems. When it came time to begin the reservation project, there were a number of seemingly new technical choices to be evaluated. Oracle had announced new versions; Sybase, Inc. and The ASK Group, Inc.'s Ingres Products Division were being used for large applications; Sequent Computer Systems, Inc. had a new and faster

box; and so on.

But we stuck with our initial architecture choices, which in hindsight was not only the right decision but the only decision. Make sure the first major architectural decision you face — whether it's object-oriented vs. relational or Smalltalk vs. C++ — will meet your demonstrable requirements during the next three years. If it does, don't change your mind because of some new feature.

TEST YOUR BONES Don't choose knife-edge technologies that have great promise but are at the boundary of current capabilities. I wouldn't try to build a reservation application in a powerful, object-oriented language yet.

You also need to evaluate what to do if a choice goes bad. This testing of future horrors is not just an intellectual exercise; it is critical to everyone's understanding of how the architectural choices fit together and how they can simplify your productivity.

WEIGH YOUR CHOICES Once you've chosen your architecture and

you're stuck to your guns by not changing technologies every year, look for the simple and effective way out of some difficult application development situations. Buy the solution elsewhere.

It still amazes me that our industry writes as much custom code as it does, given how similar many of our problems are. We may still be 10 years away from reusable applications — and two to three years from reusable objects — but it doesn't mean we should ignore off-the-shelf solutions for basic applications such as payroll.

By David Keer

SIMPLE IS BEST Hyatt has stuck with its approach for five years, not without challenge and resistance. But it has served us well, saving us 30% to 40% in operating costs and forming the basis for our major applications, including reservations.

We've evaluated some new technologies such as PowerWorld, a PowerBuilder, but we haven't yet gotten the full benefit of our experience in the current architecture. Simplicity has its own benefits, and they keep getting bigger every year. **CU**

THE USER EXPERIENCE

JOHN HANCOCK: Filing a claim in future technology

I may be dating myself, but I can't help comparing today's ubiquitous "client/server" with the single word of career advice given to the young Dustin Hoffman's character in the movie *The Graduate*: "Plastic!"

During the past few years, while we in the IS profession prepared for the arrival of the new world of client/server, somehow that new world arrived. The paradigm shifted — even though we're not ready, and the technology is neither mature enough nor industrial-strength yet.

For us, client/server has more or less evolved during the past three years. At last count, within John Hancock, we had more than 30 client/server applications on-line. Some are fairly simplistic and intended for decision-support

milestones on this long journey; others are definitions of five models for distributed computing and recommended standard products for each model.

Our efforts began last year when we devised and adopted an enterprise-wide technical strategy that outlined our vision and goals. This year, we are laying the foundation for an industrial-strength client/server environment.

We think of our client/server environment in terms of three interrelated management domains: execution, development and operations architectures.

The execution architecture is driven by technical requirements for client and server. It consists of hardware platforms, databases, distributed services and communications protocols.

The development architecture encompasses tools and methods for building applications. To prepare for skill set changes, we will be setting up new educational curricula and retraining plans, including on-the-job mentoring. We also

use outside consultants to augment our skills base and accelerate our learning curve.

The operations architecture consists of the products and processes for managing applications in a productive environment. This domain presents what is perhaps the biggest challenge as we switch from a platform-centered approach to a new model of managing distributed computing resources.

We have active projects under way on many fronts, from upgrading our wide-area network to automating software distribution and postword synchronization — to name just a few. Sometimes it seems like an endless web, with every project on the critical path!

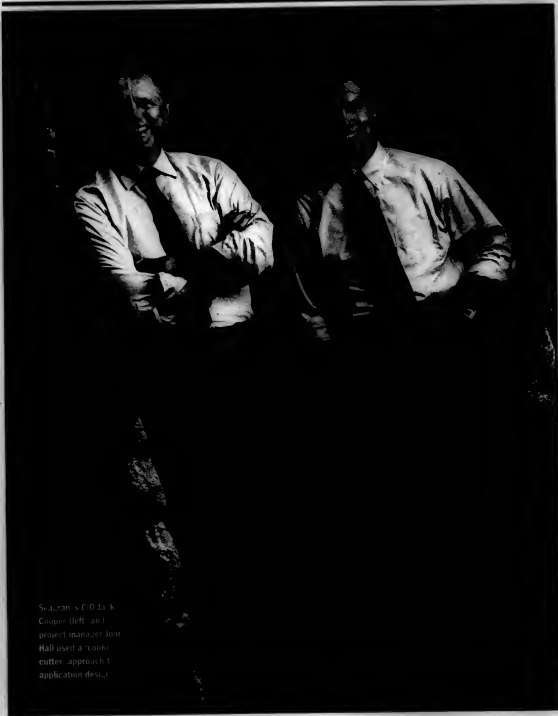
Collaboration and cooperation are the watchwords for our client/server strategy work, which involves more than three dozen people in our Boston headquarters. Associates from across the firm are also involved in a variety of task teams and committees that make up our Client/Server Environment Project.

We do not expect our initial cut at client/server architecture to answer all of our questions about distributed services and network management. But we do expect to provide leadership and direction to a diverse business community across the company and establish solid ground for future systems development. **CU**

By David Hancock

Seigel is vice president of corporate information services at John Hancock.

Two years of careful study led this giant insurer down a new path.



Seacran's CIO Jack
Couper (left) and
project manager John
Hall used a "cook-
cutter" approach to
application design.

Photo: Corbis

HIGH SPIRITS AT SEAGRAM

By Edmund Byrne

The international beverage retailer makes a business case for its leading-edge multimedia document management system

So what do you get when you cross an upstart technology with a venerable retailer of beverages, wines and spirits? In the case of 196-year-old Seagram Co., the result is a multimedia document management application that is the most far-reaching yet in a

companywide move toward client/server architecture.

"The ideal is boundary-less document access anywhere in the world," said Seagram Chief Information Officer Jack Cooper. A document may originate in Hong Kong, be reviewed by someone in the U.S. and eventually wind up stored on a computer in London.

The system, called Open Document Management System (ODMS), will also be useful for on-line companywide procedure manuals, where a video clip might illustrate a new technique or a new chapter could be added to the manual via voice annotation.

While not quite finished, ODMS has already begun accruing benefits for the accounts payable department — the first end-user group to adopt it. Among the time-savers are the following:

- The ability for employees to send and receive faxes from their desktop computers.
- Immediate access to scanned purchase orders instead of up to a two-week wait to get a microfilm tape developed.
- Voice annotation of purchase orders, which allows managers, for example, to tell processors to expedite a certain customer's account.

The big payoff arrives later this month, when the accounts payable group should have received and worked out the kinks in its work-flow management software and a tool to alter the work flow at will. The in-house-developed software will allow employees to set up, and later change, who gets to see which documents and in what order the purchase orders work their way around the department.

With those tools in place, accounts payable will be able to cut down on the time it takes to process customer inquiries. One customer service representative will be able to answer any question instead of customers — both outside suppliers and Seagram employees — having to search out one of 18 specialists.

Managers will also be able to track the productivity of each step of the accounts payable process — as well as that of each employee — through an audit trail.

Eventually, the White Plains,

N.Y., accounts payable users will be joined by Seagram brethren around the globe, Cooper said. His goal is to persuade three groups each month to implement the system.

STARTING THE BARS ROLL Once the document management software and tools have been put in place and have been proved to work, the sales pitch starts in earnest. Cooper and his team were scheduled to demonstrate the system to Seagram's Scotland subsidiary, although to date no other group has taken the bait.

By using a "cookie cutter" development approach, Cooper said, his group will be able to help end users customize ODMS wherever they may be.

ODMS joins two other client/server applications already deployed at Seagram: a sales reporting system that executives use to determine global sales by customer and a human resources information system.

Within five years, Cooper said, Seagram will move entirely to an information architecture based on two tiers: end-user workstations that are equipped with a graphical user interface and multimedia capabilities, and a network of servers ranging from PCs to mainframe-class machines.

Seagram has the majority of its production applications running on two IBM Enterprise System/9000s and a Digital Equipment Corp. VAX 6000 in data centers in New York and Bradenton, Fla. Some 35 IBM Application System/600s that are scattered throughout the world run a standard suite of financial applications

SEAGRAM page 140

Seagram's 1992 revenue by product

Spirits and wine



Fruit juices, sodas and others

For the year ending Jan. 31, 1993, Seagram reported \$4.1 billion in revenue. Net income was \$277 million.

Seagram does business in 34 countries. In 1992, the company opened offices in China and by the end of this year will have offices in the Ukraine.



Seagram's 350 Park St. headquarters in Montreal reflects its mid-19th century roots

► **SEAGRAM**, from page 13

and some production and logistics. The company will continue to use these larger, proprietary machines as databases and other types of servers. "This will happen in concert with the re-engineering of our business," Cooper explained.

IN THE BEGINNING The business traces its history back to 1857 with the founding of Joseph E. Seagram & Sons' distillery company, which merged in 1955 with Samuel Bronfman's Distillers Corp. It was the Russian-born Bronfman, whose descendants still run the firm, who molded Seagram into a corporate powerhouse that today manufactures and distributes the best-selling brands of whiskey in the world.

The Seagram portfolio of products ranges from Chateau Regal and Ferrier-Jouet champagne to Monterey Vineyard wines and Tropicana orange juice. Its global reach of 34 countries on six continents underscores the importance of its move to client/server applications such as ODMs, which Cooper said must meet specific business needs but also be tailored to work anywhere in the company.

Thinking globally was also the mind-set behind Seagram's earlier client/server applications — a sales reporting system and a front end onto the mainframe-based human resources applications — which have been running for about a year.

Because of their simplicity, they were "good candidates" for the company's first client/server turns, said Joseph Herrin Jr., director of systems development. Both are essentially decision-support applications that "are relatively inexpensive and safe because they do not directly impact the business, although they help in running it," he said.

Furthermore, both applications share a common architecture: an Intel Corp. 486-based PC acting as a file server on a Novell, Inc. local-area network. In both cases, data from other sources is summarized onto a Gupta Corp.

The employees in accounts payable can use the new system for instant on-line access to purchase orders that once took as long as two weeks to obtain.



► **PERSONAL BUSINESS** JOHN HALL works with *Condor* Pulse and *Lotus Green* on the ODMs system.

SQLbase relational database management system that runs on the server. Windows-equipped PC clients complete the picture.

The nonaffiliate sales reporting system is used to help Seagram executives track what they sell in countries or locations too small to have full-blown offices. These locations do not have the usual back-office operations that support larger Seagram entities "so they lack some information about the state of the business," Herrin noted. "We wanted to provide some electronic means for them to see how their business is doing, instead of getting monthly printed reports from different sources."

Data from different shipping locations is sent to the PC LAN in New York via a standardized transmission format. The data is then processed and loaded into the Gupta DBMS, from

which it is transmitted to servers in three other Seagram offices. Herrin's group is adding more kinds of data to the mix, including accounts receivable, and is setting up data extracts about specific customers and products within the geographic regions. Currently, the data is set up by region only.

As for the human resources system, that is simply a graphed front end to mainframe human resources applications.

"The idea was to provide easier access, not to replace the mainframe systems," Herrin said. Rather than logging on to the network, the mainframe and the specific applications — and then navigating through whichever application is required — users simply log on once and view a screen of choices.

"We extract the data that is most important to the users, which they select," Herrin said. The data extracts are updated monthly.

In contrast to these decision-support applications, ODMs was intended as a more strategic, *bel-your-business* kind of system.

It took a little more than a year and about \$400,000 to develop the document management system with a two-person team that used off-the-shelf tools (see related story page 16). It will cost roughly \$5,000 per user to deploy, Cooper said. That deployment cost covers most of the client hardware and software, including a Macintosh with a 21-in. color screen, a runtime license for the image decompression software used to view the scanned images, plus all the software to track, view and manipulate the purchase orders and related information.

The scanners and software used to scan the purchase orders into ODMs are not included in that price.

Notable consultants or services were used — one reason why ODMs was "on time and on budget," Cooper noted. "We can't always claim that, but it happened with this one."

Because of the global rollout intent, there were several tenets that the ODMs design team held to: scalability, open architecture, support for as many national languages as possible and the ability for end users to change the system as their business requirements change. To accomplish this, Seagram developers built the server database — Sybase, Inc.'s Sybase running on a Hewlett-Packard Co. 9000 Model 720 — to dynamically configure each user's screen

SEAGRAM, page 16

Object (and other) lessons

As a triple-play veteran of client/server projects, Seagram has learned firsthand about the joys and sorrows of this brave new computing world.

Some of the advice the staff offers for novices is as follows:

THINK BACKUP AND RECOVERY

"It is absolutely essential that you have the appropriate levels of backup and recovery, and they have to be a part of the system design," CIO Jack Cooper warned. "But you don't have as much canned material to do this with client/server software as you do on the mainframe, so you have to write your own."

PREPARE STAFF FOR CHANGES

From a programming standpoint, client/server is much more "rigorous" to deal with, Cooper noted, and there are fewer people who know how to do it. To address this concern, Cooper brought in Joseph Herrin Jr., director of systems development, and John Hall, distributed systems project manager, to head up client/server development at Seagram about two years ago.

As the company moves its legacy systems over to the new environment during the next three to five years, the IS staff members who work on those systems will be trained "so they can develop on the new technology," Cooper explained.

WALK OUT THE LEARNING CURVE

Herrin said it takes about six months for a experienced C programmer to become "reasonably" productive in C++ object-oriented techniques and "to realize what you have and what you can use."

That learning curve, while steep, pays off on subsequent projects, he added.

PLAN FOR SCALABILITY

While working through the challenges, Cooper said, remember the goals of client/server. They include enormous scalability, the ability to design once and deploy many times and uniformity of systems throughout the company. Delivering "strong functionality" to end users is another important benefit. Users "can do more, with a higher degree of control over the work process and a higher degree of productivity," Cooper said.

DO THE MATH... AND BREATHE EASIER

Finally, something sure to warm the cockles of many CIOs' hearts: Seagram has found that developing for client/server is 12% to 15% less expensive than developing for other platforms. These costs include hardware, software development, system design and planning. Support costs are about "break-even" from one platform to another, Cooper said.

For your personal copy,



It is not a mere technical treatise.

It is not a dry, 400-page book full of jargon.

It is an accessible, well-structured, highly authoritative, high-level discussion of client/server computing across the enterprise.

call 1-800-8-SYBASE.

Seagram, from page 14 depending on the needs of that person. This approach was taken instead of the "hard-coding" approach traditionally used for applications, where the same screen is provided to every user.

Although the server database is currently on the HP machine in New York, that may change as other departments adopt ODMs. The server can sit at the end-user location, as the business rules and data it contains are department-specific anyway, or it can be located at some central IS site.

The fax server is an Intel-based machine, as is the image server, but most of the hardware components—except for the Macintosh client piece—can be changed later. For example, the server portion that currently runs under Unix on the HP 9000 can run on any Unix machine. Similarly, other parts of the C++ language-based ODMs are portable.

As requirements change, IS needs only to update the server database instead of each client machine. Alternately, users will be able to make some changes themselves once the work-flow tools are delivered this month. In accounts payable, for example, if an invoice over \$10,000 needs management approval and that amount is later raised to \$25,000, users can amend the work-flow software rules.

The open architecture also separates the various components of ODMs into Macintosh objects: one for retrieving scanned images from the scanner, one for faxing, another for viewing the image on the Macintosh, etc. If Seagram needs to change one object down the road because, say, a more efficient compression algorithm becomes available, it will not impact the other objects. Also, new objects, such as one for video, can be added with minimal disruption. But expenses come with a cost. "Building flexibility in our front

doubles development time," said John Hall, distributed systems project manager. "You realize or by benefit later, when users can make the changes instead of having to go through IS."

Scalability was another key design element, so the system can be used by a relatively small operation such as the one in Oslo or by a large transactive environment such as Seagram's U.S. operation.

So far, about eight people in accounts payable are using ODMs. By year's end, that number should

The cost of developing the client/server project was 12% to 15% cheaper than on mainframes. It took about one year and \$400,000 to create a document management system.

COOL TOOLS

Seagram developed — and delivered — its multimedia document management application on the Macintosh. "It's clearly less elegant for search and other," said Joseph Benda Jr., director of systems development. "We didn't have to buy special equipment for the PCs."

Another factor was that Macintosh desktop tools are "years ahead of other platforms," he noted. And in distributed development, the tools have large investments.

Here is a sampling of what Seagram used to create its new system:

■ Apple's *Scrapbook*, Inc.'s *Workshop*, which will allow the IS group to handle the changing aspects to different cultural languages, including Spanish and French.

■ Apple's *Macintosh Object Database*, a collection of ready-made objects. The team also created objects from other client/server products. Products equivalent with Windows use just another factor in the battle here, said John Hall, distributed systems project manager of Seagram. "We got hundreds of ready-made objects," he said.

■ Microsoft's *Lotus Notes*, Inc. in California, which, to write the object that manages and disseminates the product order logs as it comes around the network. "We designed, and it works," Benda noted.

grow to about 20, including some people in California who will use viewing stations to access accounts payable data. Until then, Seagram's employees must ask that the data be faxed to them.

Candice Puleo, accounts payable supervisor, said she is "very happy" with the new system so far. Currently, invoices are processed by having the paper mail sorted out by type of bill and then delivered to the appropriate specialist. The phone bills go to one person, the supplier bills to another and the bills from Seagram affiliates to yet another person.

"If there are any questions, the customer has to call that person," Puleo explained. The person then has to rifle through a stack of paper to find the invoice and determine the status.

That will change with the work-flow software, which will allow the customer service representative to handle all queries. "That's going to be a big savings of time," especially given that the department processes about 450 invoices each day, Puleo said.

LEAD TIME ON AUDITS Another benefit should show up during the group's audits, which Puleo said are "continuous." Before ODMs, those often required grinding searches for microfilm. In one recent instance, she had to wait four months to receive more than 400 boxes of paper for an Internal Revenue Service audit. The imaging system will be a "real time-server" for audits, she added.

Nevertheless, Puleo said, as the first users, "we're working out the bugs."

Most of the problems have been resolved, but printing a scanned invoice still takes up to five minutes. Earlier on, there was also a wait of up to a couple of minutes to save each scanned image, but that was fixed by moving one of the servers from New York to a technical center near the accounts payable department.

"That's put us a little behind in scanning," Puleo said, "but these kinds of things are pay for the course. All in all, we're lucky to be working with the in-house IS group because so far there's nothing we've asked for that we haven't gotten."

Originally, Seagram had looked at off-the-shelf imaging systems. But at a one-time deployment cost of \$40,000 to \$100,000, members of Cooper's team determined they could do it themselves for less money in the long run and meet specific business needs as well.

"We're ensuring our architecture stays open and is geared for the future," Hall said. **CJ**

Ambrosio is Computerworld's senior editor, systems & software.



A VIEW FROM THE LINES of Seagram's Scottish fax distillery belies its high-tech operation

Managing documents the multimedia way

Among the first Seagram facilities to try out the new document management system this fall will be the accounts payable department in the Scottish Highlands near Keith, home of the Chivas Regal and Glenlivet brands of whiskey. Employees using the new method will follow this procedure:

After a purchase order is scanned into one of two Macintoshes, an employee working as an indexer pulls the image up and keys in several fields of data about that purchase order.

Assuming there are no problems with keying in the fields, the data is entered into the Sybase database running on a Hewlett-Packard 9000 main Unix server. If there are problems keying in the proper data, the indexer logs on to the mainframe from the Macintosh and searches through the host financial software for the proper information.

The image is actually stored on an optical server, which is now a Sun Microsystems, Inc. workstation, but will soon move over to the HP 9000 server. The optical server moves the image files between the end user's magnetic disk on the Macintosh and an optical disc set-up controlled by a Laser Magnetic Storage, Inc. jukebox.

When employees in the accounts payable department log onto the Macintosh, they will see several things on the screen: a listing of all the purchase orders that have been scanned in and are awaiting processing; a window into the corporate mainframe; and objects providing users with functions such as sending or receiving faxes.

To send a fax, the user will activate the fax icon on the Macintosh and fill out a form. That request is then shuttled to the HP server. A separate machine acting as a fax server—a Compaq Computer Corp. 386-based computer—pulls the HP server every 30 seconds and takes over when it finds a fax request. ■



Coping with the technical and managerial snafus in migration and conversion projects

SHOWSTOPPERS!

One of the war stories making its way around the client/server conference circuit recently concerned a Chicago-based bond trading company and its unfortunate experience with a Unix utility called cron.

Seems that cron, which can be set up to run certain computing jobs at specific times of the day, was primed for a crucial 3 a.m. processing job every night. Before cron swung into action, however, a series of smaller jobs had to be run for about an hour each night, beginning at midnight.

But one night the data center operator was ill, and the small jobs didn't begin their run until 2 a.m. They also didn't make it to the finish line. And cron did what every good Unix utility does: what it was told.

The result was a showstopper — in this case, a commercial processing snafu with the wrong data overwritten or erased and financial records compromised. Senior managers at the Chicago firm reportedly "went ballistic."

The moral of the story — one that mainframes particularly relish — is that complex business processing environments still require the built-in protections and controls that large systems were fine-tuned over the years to provide.

As commercial enterprises today migrate away from the safety of the traditional glass house toward the greater flexibility of distributed client/server systems, they are bumping into a new lineup of project showstoppers. These technical and managerial snafus can halt a conversion or migration effort for hours, days and even months.

"Client/server ought to come with a label saying: Misuse of this could be harmful to your health," said James Daly, director of human resources administration at New England Telephone Co. in Boston.

A recent survey conducted by *Client/Server Journal* among 218 corporate users at medium- to large-size businesses showed that 36% experienced technical problems that stopped projects cold for one to three months' time. Another 18% got stalled for at least a week; 15% for more than three months; and 10% for at least one day. Only 19% reported no work stoppages from technical difficulties.

"Everything that applies to good business practices in computing in general applies to client/server, but people overlook that," said Wayne Fowler, director of technology and network services for Canada's Toronto Stock Exchange, one of the pioneering users of open systems for mission-critical business computing.

Among the most commonly cited delays in client/server projects are the cost of training and retraining users, the need to fill in feature/function gaps in third-party software and the tedious job of integrating multivendor systems.



"What happens in client/server is the negative gets amplified and you find yourself deeper and deeper in trouble," Fowler noted. "In essence, client/server amplifies stupidity. If you're stupid about systems development, design or requirements gathering, you essentially end up far worse, quicker."

While showstoppers are often as highly individual as the business itself, there are several categories they seem to have in common: performance testing, networking, support, personnel and software issues.

SHOWSTOPPERS, page 20

Johnson is editor, *Computersworld Client/Server Journal*.

Why combine a number of SPARCstations,

when a network of HP workstations and X stations operates for less?

It just stands to reason. The more engines, the more cost. Not only in initial purchase price, but system administration, backups and OS updates. That's why more and more people are getting on board with an HP workstation/X station network. A powerful engine that carries plenty of passengers.

At Hewlett-Packard, we understand that not every situation requires a workstation. A network of our Series 700 workstations and 700/RX X stations can give users full PA-RISC workstation functionality and HP's industry-leading speed at a fraction

of the cost of a Sun SPARCstation network. And as your operation grows, workstations can be upgraded and X stations easily added.

Whether you're in customer service, manufacturing, finance, engineering, or the hospitality industry, you'll enjoy the benefits of central system administration, low cost of ownership, and access to network-

wide resources. And your HP solution isn't just a good investment to start with—it remains one for the long haul.

No wonder HP is recognized as the world-wide leading supplier of color X stations, and is delivering workstations with the highest performance.

To get on board, call 1-800-637-7740, Ext. 70988. In Canada, call 1-800-387-3867, Dept. 2308.



**HEWLETT
PACKARD**



© COMPUTERWORLD, FROM PAGE 17

1 TESTING IS 'HEAVY DUTY'

One showstopper the Toronto Stock Exchange encountered involves performance testing in the complex client/server environment. "It's insanity plus," Fowler said. "We've found a tremendous lack of structured test tools and a tremendous misunderstanding of rigorous testing processes."

In the mainframe environment, testing a fixed number of screens or fields is commonplace. "But what happens when you have multiple 'windows'?" Fowler asked. "What happens when applications pick up information from one win-

where there haven't been any before."

To sidestep network bandwidth problems, one major New York securities firm "over-engineered" itself by wiring up each trader workstation with eight strands of fiber-optic cable plus 10 strands of copper-unshielded twisted pair.

Although the use of Ethernet and Transmission Control Protocol/Internet Protocol (TCP/IP) networks is a mainstay in many client-server shops — particularly Unix-based ones — there are still messy issues with getting it to work right, users said.

The Toronto Stock Exchange found that the first implementation of TCP/IP on a Tandem Computers, Inc. mainframe did all the networking within the CPU, for instance. "So we ended up having the busiest task in the system being the TCP/IP driver because the way Ethernet and TCP/IP work, they monitor all the traffic and pick up what's explained," Fowler exclaims. "You spend all your time monitoring traffic. We had to segment the network with Cisco routers and hang them

around the Tandem to isolate it from traffic that doesn't belong to it."

3 SUPPORT TAKES ON NEW DIMENSIONS

Higher-than-anticipated levels of technical and administrative support are frequently cited as showstoppers in client/server projects. One particular pitfall, such as classroom teleconferencing or what they want. That can spawn a highly diverse, mixed environment that escalates and complicates support needs.

"How companies address that support cost will dictate how successful they will be," said New England Telephone's Daly.

"There is a whole learning phenomenon with client/server that has not been properly scoped out yet," Daly said.

New England Telephone emphasizes a strong education component for its technologies. Daly said, including a resource center where employees are encouraged to come for hands-on training. The company uses both formal and informal training opportunities, such as classroom teleconferencing or placing individual learning centers in heavily populated business locations.



4 THE HUMAN FACTOR

When asked what terrible technical trials they encountered on the road to client/server, many information systems executives said technology was sometimes the least of their worries. What tripped them up instead was the human factor — from recalcitrant programmers to reluctant users.

"I'd say our biggest issues were getting people trained in the new technologies, getting them productive and thinking of data in different ways," said Pompei Malik, manager of IS at Brewers Retail, Inc., a \$1 billion beer distributor that manages 450 retail and wholesale outlets in Ontario, Canada.

Rewarding the teamwork required to make client/server development projects a success — while still recognizing individual skills — was — is a delicate balancing act. Several IS executives said. According to industry surveys, staff turnover during conversion projects averages 30% to 40%.

"The people transition issue just surprised the hell out of us," said Jim Stillebreder, director of systems development at Kash n' Carry Food Stores, Inc., a \$1.2 billion grocery store chain in Tampa, Fla. Its client/server migration sparked a 70% exodus of the mainframe programming staff in the first six months.

In the future, Stillebreder said he may try out an idea passed along by colleagues at a user conference: team up two or three programmers, one of them a "new architecture type" and the others old-school mainframers.

"I think that very intense mentoring will do a couple of things," Stillebreder said. "One, it'll make the transition less scary. They're not learning by themselves. And two, you have built-in bonding so you get constant encouragement and a little hand-holding."

5 COUNT ON SOFTWARE GLITCHES

Software-related showstoppers are perhaps the most commonplace of all in client/server shops. According to users, there are still huge holes in the areas of system and network management software.

They also cite availability shortcomings when PC and workstation software goes big-time on a corporate network. And many companies are bedeviled by version control and software distribution

ASK THE TOUGHER QUESTIONS

There may be nothing to ask the right questions of their readers, several managers and consultants said. Rather than asking "Can we do this with this solution or that platform?" the better question might be "Would we want to do that? What's the downside?"

At one publishing company, for example, a 30-volume desktop encyclopedia on the old mainframes moved into a 35-hour effort on a 30-volume server mounted on a 30 — but not until the end version.

problems with multiple packages running on different hardware platforms.

"One of the biggest challenges of client/server is software distribution," said Linda Kern, manager of application development and support services at El Paso Natural Gas Co. in Houston.

"Before you can do heavy-duty client/server for transaction systems, you have to be able to automate that process," Kern said.

At Hickory White Furniture Co. in HighPoint, N.C., migration from a Burroughs Corp. mainframe environment to Unix-based systems from Sun Microsystems, Inc. has been hobbled by a series of problems with third-party software, said Pat Thomas, MIS director at the \$60 million furniture manufacturer. Those difficulties include smooth-overline versions of certain software packages, plus inaccurate or incomplete documentation.

Describing his current frustration with open systems, Thomas likened the situation to a "megaproject storm" where all the named good cost 30 cents but not one has a label.

"All the responsibility is yours because you've become the system integrators for your company," he said.

Taking on that job of systems integrator is often one of the rude shocks involved with client/server, according to Jerrold Grochow, vice president of advanced technologies at American Management Systems, Inc. in Reston, Va. "Invariably, it takes much longer to deal with these issues than anyone thought," he said.

Despite the inevitable showstoppers, however, users and consultants said that even the most difficult projects eventually get done. "Setting expectations and being able to deal with things are part of the management issues in client/server," Grochow noted, "so a problem becomes something to solve rather than a disaster." C&I

WATCH THAT DATA STRUCTURE

An Oracle-based gateway rather than of Harry Houdini, Inc. put its client/server environment on a tightrope. "We had a lot of things that seemed to work," said Ron Stillebreder, director of systems development. "We discovered later pretty quickly that our data is, as we found, based on this project with large enterprise marketing activity."

"We were surprised how much we had to do to the data file," he added. "It took me about two months to get a relational table, close up the existing system and understand what we were really doing."

dow to another before they ship a request to the server? Physically, how do you test that?"

One product Fowler is working with now for the kind of benchmark simulation he needs is the RhoNet master controller from Promark in Parsippany, N.J., which enables the user to tailor custom scripts that replicate users keying live data into the system. The vendor is adapting its testing tool to interact with the stock exchange's Unix-based transaction monitor.

2 NETWORKING MORE COMPLEX, CRUCIAL

As the likelihood of any client/server setup, the network is frequently the trip wire for a host of troubles, from bandwidth limitations to in-expectable crashes and data loss. Client/Server Journal's survey of 218 users found that 60% of their problems related to connectivity or networking, for example.

"For technical showstoppers, the network is the one I keep running into the most," said Hugh Ryan, director of Andover Consulting's New Age Systems unit. "Our clients get into this and fail to anticipate the difficulty of upgrading a network, particularly if they are putting in machines

“In essence, client/server amplifies stupidity. If you're stupid about systems development or design or requirements gathering, you end up far worse, quicker.”

WYTHE FOWLER
DIRECTOR OF TECHNOLOGY
AND NETWORK SERVICES
TORONTO STOCK EXCHANGE

The Wide-Area Information Server on the Internet is ready for its commercial debut, as a popular grassroots application comes of age

THE CASE FOR WAIS

By Barth S. Balbeck

A new concept in client/server computing, the Wide-Area Information Server (WAIS), is coming of age on the Internet as a way to broadly disseminate information. It offers a promising model for the commercial world as well.

These wide-area servers are providing access to databases of public or quasi-public information to any interested Internet user. There is a weather information server run by the University of Michigan, for example, and another that offers the lyrics of any popular song. So far, there are 434 WAIS-based databases out there.

THE FREEWAVE CONNECTION

To obtain WAIS client/server licenses, an Internet user can send the following address information, which is the headquarters for National Information Science and related to Research Triangle Park, N.C.

The software is also available by using the anonymous ftp 0/0 Transfer Protocol connected to another Internet address accessible. For the path of Balbeck to get to the Internet database.



© UNIVERSAL KAHLE says that while people await the information "superhighway," today's Internet has become the well-traveled 'dirt road'

"What people are looking for is the information superhighway. What we have is an information dirt road, but it's working," said Brewster Kahle, who created the Internet's first WAIS while working at Thinking Machines Corp. in Cambridge, Mass.

Some Internet users—including Kahle, who last year founded a private company, WAIS, Inc. in Menlo Park, Calif., to sell wide-area client/server software—are confident there is a commercial future for the wide-area network server. One scenario is that a new form of publishing business will be established to make vast quantities of information available at a fee through WAISs.

COMPANY BLUEPRINT "Access to reference information is extremely useful in the business world," noted Dan Goldman, spokesman for Perot Systems Corp. in Reston, Va., an early WAIS, Inc. customer.

WAIS provides a blueprint of how companies could make reams of standard, up-to-date information available to their employees. Lawrence Livermore National Laboratory in Livermore, Calif., is putting its management guidelines and health and safety rules onto a server that will be accessible to those who need it at the 8,000-employee facility, said David Grubb, a member of the lab's administrative information systems staff.

The Internet examples of WAIS are necessary public information servers and open to any Internet user with the means to access them. But a business seeking to create its own WAIS has several options for keeping them closed to

employees or restricted to groups with the appropriate access privileges. Livermore Laboratory's in-house information, for example, will be placed on a server that is screened off the Internet by a router placed in front of it, Grubb explained.

Any business with a WAN can theoretically build databases and make them available on low-cost servers. WAIS also offers the opportunity for more direct information sharing between companies and their customers. Sun Microsystems Inc., for instance, has established a customer support database at the University of North Carolina. Customers can turn to that server for help before tapping more conventional forms of support, which in turn helps hold down costs for Sun.

Wide-area server capabilities came about through an early effort to automate library and other research text exchange over great distances using the Z39.50 protocol, which managed computer-to-computer links over a WAN. While at Thinking Machines, Kahle built the WAIS on top of the protocol to create a user-friendly approach to the wide-area server.

Mimicking the searches of large text management systems, Kahle created a search mechanism using key words typed in by the user. The search returns a list of documents to the user, with those scoring the most keyword hits listed at the top. By selecting those that are most pertinent, the user can direct the process through a feature built into WAIS called "relevance feedback."

CSI

Balbeck is Computerworld's technical editor.

'OPEN' SECURITY:

Client/server design promises easy access to reams of critical information. Yet it also ushers in new ways for intruders to gain access and lose data. Here's how to cope.

Continued from page 21

It's enough to give the most steadfast information security chief the willies. Thousands of PCs and workstations with dissimilar operating systems spread across an organization, connected to networks, minicomputers and mainframes in other locations, sometimes across states or countries.

It's also a reasonable description of a client/server environment.

The wide distribution and easy access to critical information, which has many users salivating over the prospect of establishing a client/server network, is already proving to be a nightmare to those trying to secure that data. Open networks mean new channels through which data can be lost and intruders can gain access.

"It's a whole new ballgame right now," said Brian Redler, director of security and operations at National Securities Clearing Corp., a financial services firm in New York.

Providing security in a widely distributed client/server design is different — far different — from the mainframe-centric, centralized security planning of the good old days. For one thing, many of the tools needed for the job are simply not there yet. "The approach right now is to cut and fit with what's available and, to tell you the truth, the fit isn't always that good," said Fritz Wagner, manager of corpo-

Daly is a Computerworld West Coast senior correspondent.

rate electronic information security at Du Pont Co. in Wilmington, Del.

Managing a mixed-platform client/server environment also means managing a lot of user confusion about things such as identifications, passwords, log-on sequences, data encryption and access privileges.

Yet information systems security chiefs need to get their hands around the issues — and fast. Some security experts say that protection of the electronic access to corporate resources may prove to be the most important issue in the next phase of client/server architecture development.

Consider the cost of letting down your guard. The Communications Fraud Control Association estimated that losses caused by unauthorized access to computer and telephone systems last year exceeded \$500 million in the U.S. and more than \$2 billion worldwide.

In another study by the University of Texas at Arlington, 43% of the companies that lose a major portion of their data via a major disaster (be it hacker or burrienne) will never reopen. And 90% will be out of business within two years.

"We're at the end of legacy systems and the beginning of broad distributed systems, so it's a critical time for people to plan for these things," said Bill Lowery, a manager at Toolmaker, Inc., a systems integrator in Bellevue, Wash.

Still, it won't be easy. Securing a client/server environment is like throwing mud at the invisible man — it may be messy, but pretty soon you get an outline of what you're up against.

NAME KNOWLEDGE Information security chiefs need to borrow into the client/server design process as soon as possible. "Computer security is still a difficult point to get across," said Jack Skalon, a network specialist at the University Hospital Consortium in Oak Brook, Ill. "People need to know security is not a joke."

Chief executive officers and top managers also need to play a more active role in planning data security, which some experts say is one place where early mistakes are made. "Sometimes I think that security administrators need to go to a Dale Carnegie course and learn

DU PONT'S FRITZ WAGNER says users must step up to the controls when it comes

SECURITY PRODUCTS

How do users rate their client/server products?

8%	Peer
24%	Fair
34%	OK
18%	Good
2%	Excellent
14%	Other/Don't know

What security tool would users most like to have?

58%	Cross-platform security products
43%	Single sign-on network access devices
43%	Telecommunications security packages
38%	Virus protection packages
20%	Data encryption devices

RESOLVING THE PARADOX

SWAPPING SECRETS

Like secret agents meeting in a dark corner of Gorky Park, computer users on a network must be certain of one another's identities before they can confidentially exchange information.

One of the primary data authentication standards for open computer networks is Kerberos, which was developed by MIT. Kerberos requires users to exchange secret messages that prove their identities to one another, while concurrently preventing unauthorized parties from eavesdropping on data that is on the wire.

Kerberos allows its users to identify themselves and verify their identities with secret key encryption technology. These credentials, called tickets, contain user information such as name and location.

In addition, Kerberos provides the principals with a secret key, which they use to exchange confidential messages. Possession of the secret key, which aligns each party to encode and decode the messages, constitutes verification of the credentials.

For example, a national sales manager might want to dial into a database to see which region is burning up the boards on widget sales. Before the database service complies with that query, it must verify the sales manager's identification.

Kerberos is not without its critics. They say it requires tremendous technical knowledge. End users, however, may be desperate for the software standard no matter what the cost. Kerberos has the endorsement of the Open Software Foundation, and some 700 user companies are implementing pilot programs based on the security standard. ■

Ways to stand guard over corporate data: Raise user awareness; control file access; back up critical data; and beef up your company's security ranks

to security—and not leave it solely up to the IS department

how to better sell their jobs to their managers," said Cheryl Currid, president of the Currid & Co. consultancy in Houston and director of information technology at The Coca-Cola Co. for eight years.

Several user groups are involved in client/server security. These include SAFE (Security Alliance for Enterprise), a recently formed voluntary group dedicated to enhancing the security of Unix-based networks, and New York-based OURS (Open User Recommended Solutions), a relatively new user group.

Security awareness must likewise be passed to the user community. "We're distributing the resources, and we're also distributing the responsibility," Wagner said. "The IS guys can't

do it all. Users need to take control of their own environment."

FIX NEW SECURITY DESIGNS INTO OLD ARCHITECTURES

"Just because you decentralize the computers doesn't mean you decentralize all the security administration," Currid said. "We went through an enormous decentralization process, splintering data from one mainframe onto 50 servers. But we did not decentralize security. It ended up being put in the hands of more than one person, but we did not give every Tom, Dick and Harry the keys to the computer."

The new distributed function may create a need to hire more security employees. That happened at Mastercard International, Inc. in

St. Louis. "We found that we needed to bring more people in just to keep up the same level of security," said Tom DeWald, manager of technical development at Mastercard.

CONTROL FILE ACCESS Illegally accessing systems is quite easy. "I can get into nearly any corporate network just by tapping in numbers randomly," said Robert Schiffrin, a hacker-turned-security consultant who once broke into Prince Philip's electronic-mail file in England. "People just leave their IDs and passwords lying around. It isn't all that hard."

STAY WITH THE GAMES The most promising line of security, page 26 ►

IBM Client/Server

PS/2, OS/2 and IBM are registered trademarks of IBM Corp. © 1993 IBM Corp.

“IBM helped us move as fast on the ground as we do in the air.”

John Harper, Sr. Vice President—Information Services, USAir. USAir wanted to create the terminal of the future at Pittsburgh International Airport. A place where lines would be shorter. Where baggage handling would be quicker and more dependable. And everything from check-in to take-off would be easier and less confusing for travelers.

So IBM helped USAir develop a tailor-made system that makes information more readily

available to employees so they can be more responsive to customers. A system that maximizes the power of PCs and integrates a wide range of different manufacturers' equipment.

A classic example of IBM Client/Server.

Information is now distributed from the mainframe to 650 PS/2[®] workstations running OS/2[®]. These workstations are tied into hundreds of ticket and boarding pass printers, touchscreens, credit card readers and other peripherals supplied by a number of companies.

The result: USAir employees and passengers now get immediate, consistent and reliable updates on pertinent information. Skycaps use touchscreens and bag-tag printers to streamline curbside check-in. And tower operators can make better decisions about managing gate traffic, resulting in fewer delays. In short, the airport of the future.

If you want a custom-tailored solution that gives your people more flexibility and gives you an edge on your competition, IBM Client/Server is the answer. For more information, call 1 800 IBM-0045, ext. 20.

There's never been a better time to do business with **IBM**[®].

SECURITY. From page 27
attack for intruders seeking access to data on a network is a networked workstation. These must be protected carefully. Restrict access and power-up to workstations through keys, identification cards, smart-cards or biometrics.

The network administrator might also want to classify network users in order to impose the appropriate level of security. The following is a suggested three-level system:

- Administrative users who design, maintain and run the network — likely to be a small group of support and managerial staff.
- Trusted users whose work benefits from greater freedom of access to the network.
- Vulnerable users — those who do not have the need to access secure data.

Proper access control requires that authorized users have considerable ease of access, while non-authorized users have difficult access. Striking that balance — between a system secure enough to protect data but not so tightly locked as to hinder user access — remains "one of the trickiest parts of the job," Redler said.

ACCESS. Once you've got everyone under control, it's time to start keeping tabs on who is doing what. A computer file or printed report that lists attempted access is an excellent warning system that lets you know if data is under attack.

Keep a chronological log of all events that occur on the computer system. Log all workstation activity, identified by user identification, and make this feature known. The fact that all access is recorded is itself a great deterrent to wrongdoing.

Auditing should be frequent because some types of intrusion can go undetected for a long time otherwise. One threat-monitoring system is concurrent auditing, which provides continuous monitoring and reporting of unusual activity, including variances and exceptions to company policies and procedures.

CRYPTOGRAPHIC CONTROL. If information is accessed illegally, make sure it will be useless. Typically, this means that the data in the file is encrypted using some form of password as a key. Only authorized users can de-encrypt the data, using the secret password.

Encryption is a rule that should be enforced, especially for all communication to and from the host computer and especially for top-secret messages. There are many good products on the market for doing this, ranging from rudimentary, third-party vendor applications to the super-sophisticated

SECURITY THREAT— IN INSIDE JOB

The greatest client/server security risk is on the:

- 45%** Desktop client platform
- 41%** Network
- 14%** Server platform

The greatest security threat is from:

- 67%** Inside the company
- 30%** Outside the company
- 3%** No opinion

The biggest source of data loss is:

- 42%** Misperformed work
- 24%** Database crashes
- 15%** Electrical surges
- 5%** Computer viruses
- 2%** Fire or natural disaster
- 12%** Other/Don't know

Data Encryption Standard used by the government.

BACKUP CRITICAL DATA. A client/server design is actually a good tool for avoiding a total information systems loss. "In a decentralized environment, you actually have a better chance of recovering from a disaster faster than you do in a mainframe environment because it's very, very unlikely that you will ever lose the whole system at once," Currid said.

But that doesn't mean you're out of the woods. Backing up data in a decentralized environment can be tricky, according to Herb Edel-

stein, a principal at Euclid Associates, a Potomac, Md.-based consultancy. Edelstein noted that databases sometimes exist on multiple servers, which often have different backup regimens. His suggestion: Centralize the servers where they can be controlled by systems administration staff.

SIMPLY, SIMPLY... The very nature of a client/server design requires tying together multiple operating systems, each with separate access codes and passwords. But what will you do — sacrifice security to simplify it?

One solution is a single sign-on security package (see story this page). Using such an application makes moving through a complex, mixed-platform environment as easy as remembering one personalized password. For IS managers, these packages also offer an easy way to distribute security from a central location.

"You can have the best system in the world, but if everyone is pasting their passwords on the side of a terminal with little yellow sticky notes, it doesn't mean very much," said Peter Wild, an EDP audit manager at Melville Corp. in Rye, N.Y.

Most of the single sign-on products on the market create a restricted access "security kernel" on each PC that contains (in encrypted form) all the usual passwords, identifications, log-on sequences and authorizations required to access individual systems. When users try to attach to a particular system, the sign-on product prompts them for their single passwords and checks their access privileges for that system before logging them on.

"Ultimately, we'd like to have security be almost invisible to the end user, but we know that's not always possible," said Ray Mueller, president of Management Information Support, Inc. in Lakeland, Colo. "But either way, we know we have to be secure. If not, we're sunk."

CM



SECURITY PRODUCTS

When shopping for security products to meet your company's needs, the classic advice "Let the buyer beware" is the best advice of all. The following is a brief sampling of the many dozens of products available for a distributed environment. Prices range from \$250 to several thousand dollars.

• **Single Sign-On Data Access Control Systems (SMC)** from Margaret Information, Inc. in Rocky Hill, Conn. Allow users to travel through various networks and gateways with only a single password. Provides centrally managed security control.

• **SAFE** Single sign-on application from Fifth Generation Systems, Inc. in Salem, Mass. It creates restricted access security based on individual PCs and can create and distribute security tokens from a centralized location.

• **The Eagle Network Isolator** from Raptor Systems, Inc. in Wingham, Ont. Lets you specify, on a per-machine basis, exactly what kinds of communications will be allowed and when they will be permitted.

• **The Enterprise Security Manager** from Hughes STX in Vienna, Va. Places the entire enterprise under centralized control.

• **LotusNet DataGuard Security Corp.** in Hayward, Calif. Provides a range of access control products and personal authentication devices.

• **The Network Security System** from Semaphore Communications Corp. in Santa Clara, Calif. A family of hardware and software products that control access and protect data as it travels from source to destination over both local- and wide-area networks.

—BY JAMES DAILY

NETWARE: SECURE AT LAST?

In October 1992, Novell, Inc. got a disturbing call. The kind of call that makes you feel like you just swallowed a brick.

A student at Leiden University in the Netherlands discovered that with a little tinkering, any user with an easily obtainable NetWare server account could gain access to any other user's file.

The chilling potential of that security gap led to NetWare 4.0, released in March of this year, which Novell officials claim is their most secure product to date. That's a given — network security was virtually nonexistent on Version 3.0.

The updated NetWare packs in security features from a password integrity checker to data encryption techniques and audit trail services. A directory services utility provides a simplified way to grant and manage the security privileges of global network users.

Version 3.0 also restricted the ability of the system administrator to delegate responsibility to subadministrators. Version 4.0 provides a more flexible approach, allowing the system administrator to grant a subadministrator specific authority to perform certain functions while withholding others.

In addition, an authentication service also verifies the validity of a user's identification, using RSA Data Security, Inc.'s encryption key technology. A client's signature, the basis of authentication, is valid only for the duration of the current session. The signature itself is never transmitted across the network.

Prior to Version 4.0, NetWare provided customers with security implementation services in the areas of administration, access control and assurance. Auditing services were limited but were provided through third-party products.

WHOW!

Network is far ahead

Managers try to regain control as client/server applications wreak havoc with communications bandwidth and user response times

By Dennis M. Weisler

Companies splintering their data processing across far-flung, shared computers have discovered that the networks gluing these distributed machines have the power to single-handedly ambush the most well-intentioned client/server efforts.

Consequently, information systems departments are learning—some the hard way—that the care and feeding of a corporatewide network is a science in itself.

"Everything in client/server computing depends on the network," asserted Raymond Perry, vice president and chief information officer at Avon Products, Inc. in New York.

Perry has added three people in his networking and hardware staff

to manage five relatively new client/server applications, including a desktop publishing system for designing Avon's weekly products brochure.

"Just keeping the network operational while adding and removing workstations is a significant task in itself," Perry said.

The IS department, which was largely left out of the loop as pockets of local-area networks sprang up around the corporation, is now finding itself charged with preventing a single hiccup in what has grown into sprawling internetworks. This task means ensuring that the network—which is continually expanding and changing—is rock-solid reliable, delivers the predictable response times that terminal-to-host users have



▶ **WIDENING THE HIGHWAY** The corporation's network manager while adding and removing devices is a major challenge on its own, says Avon CIO Raymond Perry

come to expect and does not drain the corporate coffers.

IS groups are tackling these challenges in a variety of ways, ranging from looking to technology for managing network bandwidth to reorganizing their staffs.

For example, when JC Penney Co. in Dallas began deploying client/server applications, "what really killed us was NetBIOS," said Jim Ducatelli, manager of advanced information technology. NetBIOS, a LAN protocol upon which many client/server applications sit, broadcasts itself across the entire network each time a session is opened, he explained.

JC Penney added one NetBIOS-based application too many, Ducatelli said, and "all of a sudden—boom! Links started to congest, and response times dropped."

In addition, the widely used Transmission Control Protocol/Internet Protocol (TCP/IP) "has

tremendous overhead" that can clog the network, Ducatelli said. "It's much larger than that of SNA [Systems Network Architecture] because TCP/IP was designed for a global environment, and SNA was designed for just one."

HOPING TO COUNTERACT these ill effects, JC Penney is working with its router vendor, Cisco Systems, Inc., to activate appropriate router filters that suppress such needless traffic from traversing the internetwork.

Until networks simply become fast, cheap and widespread enough to accommodate whatever traffic loads users decide to pump into them, vendors are coming up with innovative interim techniques to help users control their bandwidth (see story page 26).

WEEKLY page 26

WIDENING THE HIGHWAY

Beta superhighways are opening up access to network services that accommodate client/server computing. A key component is Synchronous Optical Memory (SOM) technology, a very fast fiber-based communications platform. Some Somat projects in the works now include the following:

■ A \$200 million, 12-state effort by GTE Telephone Operations to install 56 circuits in 1993 and 1994.

■ A \$4.4 million endeavor in North Carolina for a statewide government, educational and medical network. Initial services are expected to start 1994.

■ "Pride" citywide Somat installations by the city of Milwaukee and Chicago-based Commonwealth Edison.

■ Efforts by New York Telephone to build a regional network linking medical, manufacturing and research and development communities that will eventually connect to the public telephone network.

9 WIRELESS FROM PAGE 27

One large company saw that "sloppy" application development could result in unexpected bandwidth demands by putting unscheduled data on the network. Thus, development and network people at Covox Computer Corp. have joined forces to make sure "the correct processing is done in the correct location," said Coyne Gibson, manager of information technology at the Richardson, Texas, firm.

"Our database administrator is now part of the information technology group. He understands what's going on with both the network and the database and can communicate network issues to the developers," Gibson said.

Michael Millick, a vice president at Interlink Co., a Mountain View, Calif., company that provides trade shows, conferences and tutorials on how to build, operate and manage heterogeneous networks, agreed that the network administrator/developer liaison can be useful.

"The protocols and application interfaces you use all have bandwidth implications" that developers need to know about, he said. Millick added that today there are not many good guidelines available for figuring out "what part of an application should run on what processor."

A DEFICIT OF ANALYSIS tools also exists for determining how much traffic to expect over a given communications link in the fragmented client/server environment, according to Rick Vandervoort, president of Horizon Strategies, Inc., a consulting firm and maker of client/server development software in

Needham, Mass.

in a distributed computing environment, when a user hits the enter key on his client workstation, "queries can be off to multiple servers and may consume MIPS in a variety of processors," he said.

In the client/server world, this traffic is tougher to get a grip on than in the mainframe world, where IS could install a line monitor next to a front-end processor and measure how long it took traffic to go in and come out, Vandervoort noted.

To plan for bandwidth consumption in the shadow of fickle client/server applications, Kash n' Karry Food Stores, Inc. "greatly simplified how the network was constructed," said Donald E. Rimel Jr., a quality engineer at the Tampa, Fla.-based company. This entailed eliminating routers and bridges, creatively segmenting networks, direct-connecting servers to a 100M bit/sec. Fiber Distributed Data Interface (FDDI) backbone and installing X Window System display terminals, Rimel said.

Kash n' Karry had experimented with some internetworking devices, "but we immediately got a lot of traffic all over the place, which had a strong negative impact to the organization. Collisions went through the roof, and response times went down," Rimel said.

While bridges and routers allow network segmentation by segment, they create additional sources of overhead, he explained. For example, while the development team was doing megabyte compilations over the network, a word processing user would move his mouse around and "see the screen stutter," Rimel said.

Kash n' Karry subsequently isolated the developers onto their

own Ethernet with a connection to the FDDI and gave them X terminals, which transport only display traffic across the network instead of entire files. Processing of files in the X World is done on the host computer, not the desktop.

Meanwhile, the response-time challenge to IS is getting even trickier as internetworks grow across wide-area telecommunications links — traditionally orders of magnitude slower than LAN speeds.

The good news is that "broadband" wide-area networks, such as Asynchronous Transfer Mode and Switched Multimegabit Data Service, which run much faster than most of today's LANs, are emerging to handle aggregated LAN traffic.

BUT 'UNTIL THESE poorny data highways are widespread and economical, users such as JC Penney are turning to internetworking vendors for technologies, such as compression, traffic filtering and prioritization, that help them conserve and manage bandwidth.

Ashtron Pyroperov, Inc., an engineering and construction firm in San Diego that is moving its PC interrogation program off the host and onto the PC, summed up the client/server challenge this way: "Client/server represents change, and change is the enemy of reliability," said Michael McEwen, manager of IS. "Some people are buying new servers just to run client/server," and adding resources and changing application dynamics mean congestion problems, he said.

CSJ

Wacker is a Computerworld senior editor, networking.

Rx for network stress

To alleviate overworked network bandwidths, router vendors offer compression, filtering and traffic prioritization techniques on their products. Compression lets users squeeze in up to 10 times more traffic, while filtering schemes flush out bottlenecks by shutting user-identified "pathes" onto wide-area links. Prioritization gives certain types of traffic clout over others.

Swiss Bank Capital Markets and Treasury in Lieke, Ill., has looked beyond router capabilities to a smart device called the Dataziner IV from Symplex Communications Corp. The Dataziner was specifically designed for bandwidth management.

Aside from sophisticated compression, it plays strategy against network congestion. The moment it detects one, it will reroute traffic over a backup link.

It will also monitor T1 lines for congestion and homestead traffic on the multiple switched network in favor of data when necessary. Swiss Bank said it postponed new WAN bandwidth investments for at least six months when it merged with The O'Connor Partnerships last year because of the efficiencies it gained with the Dataziner.

Other tactics for handling the flood of network traffic caused by distributed computing include the following:

- **LAN SEGMENTATION.** These network segmentation products from the likes of Ahn-tee, Kalpana, Inc. and Synetics, Inc. deliver full LAN bandwidth to an individual user or a heavily accessed network resource, such as a server. This precludes growing numbers of resources from contending for a fixed amount of bandwidth but allows them to maintain existing investments in LAN adapter cards. Such capabilities are also showing up as modules in smart wiring hubs.

- **INVERSE MULTIPLEXING.** These devices let applications dial up public network services on demand, rather than paying for dedicated bandwidth that can sit idle much of the time.

The overhead with NetBIOS, a 'chatty' LAN protocol, can gobble up your network resources.

GETTING A GRIP

These technology areas help network managers keep bandwidth losses in check as networks grow to support client/server applications.

The router filters, compresses and prioritizes data by protocol to eliminate traffic as efficiently as possible.



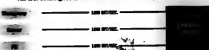
The Symplex Dataziner IV compresses data and reroutes around congestion.




The inverse multiplexer lets applications automatically dial up only the services and bandwidth they need.



The LAN switch gives individual resources their own private LAN.





Hewlett-Packard has the most powerful vehicle for the top UNIX database applications in the world.

"If you're looking for the best strategic UNIX database platform, for now and the future, it's the HP 9000."

*— Aberdeen Group**

Hewlett-Packard is the #1 UNIX hardware vendor. So it's hardly surprising that we're also #1 with the top UNIX database vendors.

More Oracle and Informix software is sold on HP than on any other UNIX platform. And we're also the fastest growing UNIX platform for Ingres and Sybase.

Our robust, rich feature sets offer mainframe-style functionality. Another powerful reason why our customers confidently expect us to remain their #1 partner in Open Systems.

Call 1-800-637-7740, Ext. 7665 for more information.

Think again.



**HEWLETT
PACKARD**



IBM Networking

IBM, the IBM logo, and the word "IBM" are trademarks of International Business Machines Corporation. All other trademarks are the property of their respective owners. © 1993 IBM Corp.

Getting all the beasts to behave takes real expertise.

Computer networks come in many different species, and they don't always get along.

Conflicts between multivendor networks can turn your business into a real zoo.

Things got this way because networking standards evolved on separate paths for reaching different goals. But today's goal, especially in client/server environments, is to pull things together, and nobody can help you do it better than IBM. We've built more

networks than anyone (over 200,000), and we've built all kinds. And we support all the leading standards, not just with words, but with solid products and services.

So if you have a DEC[®] system in one department, Appletalk[®] in another, IBM checkout lines in stores and a supplier with UNIX[®] workstations, we can make them a team. And we'll not only integrate your networks, we can help you manage them, too.

For the future, we're forming alliances with many of our competitors. You want products that communicate after you buy them, so we're talking to each other now.

We'd also like to hear from customers like you. For Caterpillar, IBM NetView[®] is managing fourteen kinds of networks as if they were one. For ADC[®] Telecommunications, we're designing a network of IBM mainframes, PS/2[®]s, Mac[®]s and DEC VAX[®]s, plus Sun[®] and HP[®] workstations, using such diverse protocols as TCP/IP, SNA and Appletalk, over Ethernet and Token-Ring.

To learn more about how we can help you, call us at 1 800 IBM-6676, ext. 725.

There's never been a better time to do business with



Client/server + object technology = BUSINESS INNOVATION

Over the years, the information systems industry has seen many technological innovations, each presented as "the coming thing," capable of solving all problems. On-line systems, structured methods, fourth-generation languages, CASE, relational databases — each was introduced with the fanfare of an old-time medicine show, and each, somewhat like a patent medicine, had its good and its ill effects.

More recently, client/server computing and object technology have arrived on the scene, like previous innovations, with an excess of fanfare and hype. But something is significantly different this time: the synergy of client/server and object technology.

That difference is evident in the amount of money being spent by organizations large and small, and by the rate at which major end-user companies are adopting these approaches. These innovations are attracting more attention than any others I've seen during the past 25 years.

While client/server may be the

Grechew is vice president and chief technology officer of American Management Systems, Inc. in Ruston, Va.



Distributed object computing is still a few years away, but it promises to solve real business problems.

latest buzzword for distributing an application and its data over more than one computer, it has actually taken almost 20 years for this architecture to make its way into the world of strategic business systems.

Object technology also got its start at least 20 years ago, so its basic ideas can be traced back to the Simula programming language in the late 1960s.

What lies ahead now as the really exciting innovation, however, is combining object technology and client/server. The distributed computing architecture is provided by client/server, while objects supply the appropriate modular units to distribute.

I'm not just talking about applications that run on PCs and store their data on separate database servers, but rather true "distributed object computing," where multiple computers participate in providing a computing function. The objects (data and processes) on one machine transparently inter-

act with objects on other machines.

It is this combination of client/server with object technology that provides maximum flexibility to adapt applications to changing business conditions. One can scale hardware configurations by the needs of different business units (via client/server) and vary the location of computing functions based on network performance (via objects).

Different human-to-computer interfaces also can be supplied to different classes of users (via client/server and objects).

Today, we regularly implement object-oriented applications that employ a database server. We also implement systems where one object-oriented application communicates with another using standard communications protocols.

But developing an object-oriented application that is itself spread across several machines is still an experimental effort. This type of distributed object computing requires the services of a distributed object request broker, a technology that is just starting to emerge

in the marketplace. The distributed object request broker allows objects to pass messages to each other without regard to where (on what machine) they are located.

While there are examples of distributed object request brokers implemented as components of commercial applications (for example, in NCR Corp.'s Cooperation development environment), general-purpose, cross-platform technology is just now making an appearance.

Given the relative immaturity of both client/server and object technology (at least in the realm of strategic business systems), much of the work going on in distributed object computing is still in its early days.

While there have been some notable successes, it will be two to three years before we see ongoing use of this technology in high-reliability, high-performance, business computing environments.

Yet with its potential of eventually solving real business problems, the combination of client/server and object technology may be just the medicine we have been waiting for.

CS

Dealing with disaster planning, legacy data and NT

STRATEGY SHAPSHOT

Access control and virus checking are not the only client/server security issues to worry about. Companies need to plan for physical threats to their networks as well — from fires to disgruntled employees, said Michael Miron, president of Miron Systems Consulting, Inc. in Playa Del Rey, Calif.

Client/server systems should be considered secure only if they can be reassembled or regenerated after a natural or man-made disaster. Miron said. This business resumption planning means backups for the following:

- **Equipment:** Detail all the necessary hardware and software to run your business, including network software and equipment, printers and remote connections. Don't forget telecommunications equipment, fax machines, modems and EDI connections.
- **Data:** Off-site backups of data are needed. Make sure to include both data on servers and any necessary data on local drives or floppy disks. "You have to have a strategy to save all your data," Miron said.
- **Locations:** Find suitable sites to rebuild the needed parts of your client/server system. To back up equipment without huge expenditures, Miron recommends that users negotiate an agreement with their computer resellers for 24-hour replacement equipment — or consider using one of the company's other locations as a repository for extra equipment.

LEHMAN FRIEDMAN

For the information systems division of Lehman Friedman, Inc., converting to client/server was not just a matter of switching hardware. When this publisher of industry directories in Tampa, Fla., moved its databases from dBase III files to Microsoft Corp.'s SQL Server, it discovered that

converting data can be an enormous project. "We spent between 25% and 40% of our conversion on converting data," said Lewis Katz, corporate director at Lehman.

The firm needed to move more than 50 databases from an old publishing system database and that meant 500M bytes of legacy data needed to be removed and validated, with dead records removed.

The four-step process used was to:

1. Define old data and create a data analysis specification on the old database. Run any old programs associated with the data and define program requirements.
2. Load data into SQL Server. Translate the data into a SQL database and analyze the data that was loaded.
3. Develop data reports and interface. Conduct additional checks for inaccurate or missing data. Create a user interface to examine and control data.
4. Get user feedback, asking them to analyze the data from both negative and positive aspects.

EL PASO NATURAL GAS CO.

Although much of its business is still tethered to a Wang Laboratories, Inc. VS1000 minicomputer, El Paso Natural Gas Co. is moving briskly toward open client/server computing as it builds a network running Microsoft Corp.'s Windows 3.1 and Windows NT.

After rejecting both Unix and OS/2, El Paso settled on NT last year despite the concerns about its stability and robustness. "We've had our problems, but the beta version we have now is stable," said Linda Kern, manager of application development and support services at El Paso, which transports gas over its pipelines for other gas marketers.

The network now under construction will eventually replace together the gas company's 1,500 PCs. By fall, the plan is to have several production applications running under NT, Kern said.

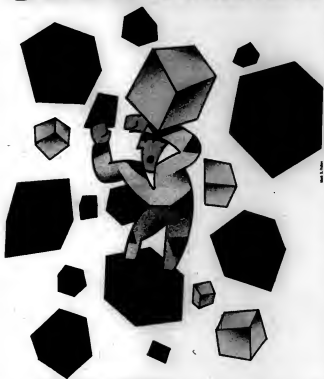
The company used PowerSoft Corp.'s PowerBuilder to develop reporting applications that allow customers to schedule gas on the company's pipelines and graphically see an analysis of their request.

"A strategic advantage for our client/server software is its flexibility," Kern said. "We can develop the programs that we're developing in the different environments that our customers need," such as OS/2, Unix or Windows.

David A. Kelly is a free-lance writer in West Newton, Mass.

Decision time

Choosing the right apps for client/server involves everything from user demands to data needs



The Data of Decisions

The decision to move an aging mainframe application to client/server was far more than a flip of the coin for Terry Longoria, deputy director at Napa County's Department of Health and Human Services in Napa, Calif.

Her department needed to update a cumbersome welfare application that was running on a Unisys Corp. 2200 mainframe. Users were complaining about how difficult it was to use—but at least it worked.

Longoria wondered whether a new client/server architecture, sporting PCs for front-end screen navigation and processing, would really make that big of a difference. In the end, it was the users who won the toss.

"They're familiar with word processing programs. They're familiar with spreadsheets," she explained. "Adding a similar interface to our welfare system puts us in line with the strategic direction of the industry."

That decision also made good business sense, said John Rymer, an analyst at the Patricia Seybold Office Computing Group in Boston. Whenever data-entry clerks are moving frequently among five or more screens and their work involves checking and cross-checking of data, Rymer said a desktop PC with a well-

signed graphical user interface (GUI) can boost productivity.

Such was the case with Napa's welfare system, which monitors continually changing government regulations. The first step was to replace desktop terminals with PCs, using Unisys' Designer Workbench to build graphical front ends for existing Unisys mainframe applications. Longoria and her team created a Windows interface that automatically navigates users from screen to screen, reduces key-strokes and handles data validation and reporting functions.

While it is still too early to tell whether the change will significantly increase user productivity for Napa County, the experience there reflects some of the key guidelines that determine when client/server is right and when a traditional host-based environment still makes better sense.

CHARACTER OF PROCESSORS Ultimately, the major factor in putting any computing architecture into place is what type of information is required, where it will be processed and where it can be optimally stored.

"We try to place our users on either side of the decision-support line," said Keith Therrien, an independent consultant and software architect at Arkwright Mutual Insurance Co. in Waltham, Mass. "When workers have complex processing to do, such as calculating premiums and adjusting insurance claims, it makes more sense to have the capabilities of a PC. But if there isn't need for much processing at the desktop, it is hard to justify the extra expense."

Arkwright is midstream in its voyage to client/server, making tools that can combine old and new technologies a primary consideration. The company found that the SmartStar product set from SmartStar Corp. was a good fit, Therrien said, because it enabled Arkwright to create a consistent presentation layer for both character cell and GUI applications.

Therrien said his team decides whether or not client/server is appropriate on a case-by-case basis. For intensive heads-down data entry, why bother users with all that pointing and clicking, he asked, or developers with spitting application logic between client and server nodes?

But some cases are not so clear-cut. "There might be an instance in which you are doing a little bit of front-end process control, and a lot of data entry," he noted. "Architecturally, it could go either way."

In these cases, it is usually the cost that clinches the decision, or the user vote. Many users have grown weary of the mechanical constraints of command-line syntax and are begin-

Continued from page 34

SOME APPLY	
Are they doing applications work that is client/server?	
YES	50%
NO	43%
DK	7%
Reported sales for	
SOME DON'T	
What type of applications are you doing?	
NEW	30%
EXIST.	25%
NEW	15%
EXIST.	5%
DK	5%
Reported sales for	

Source: On Client/Server Survey

document trail. From page 33
ning to ask why the applications
they use at the office cannot be as
flexible as the ones their kids are us-
ing at home.

WORKS IN YOUR DATA? Yet even when
split-logic client/server applica-
tions make good architectural
sense, a common complaint is lack
of facilities for database and net-
work management. With client/
server applications, data may be
spread across multiple servers,
and applications must understand
different transport protocols to
distribute information.

"This [problem] is overwhelming
us," said Tom Runkle, North
Carolina's deputy state controller
for information resource manage-
ment. "One of the promised bene-
fits of client/server is simultane-
ous access to multiple data-
bases. But we find it very difficult
to coordinate data from many dif-
ferent departments and agencies.
What we haven't ironed out yet is
the data administration side:
What data do we have? What does
it mean in this application over
here or over there? Where does it
come from? When is it updated?
How accurate is it? This has be-
come our Achilles' heel."

Such complications lead many
information systems pros to ques-
tion the "cure-all" mentality be-

hind so much of the client/server
propaganda sweeping the indus-
try today. "PCs and workstations
can provide wonderful analytical
capabilities on the desktop," said
Ed Toben, director of IS at Colgate
Palmolive Co. in New York. "But in
some cases, the sheer magnitude
of the data processing require-
ments indicate that a large, cen-
tralized system is a safer bet."

STAY COHESIVE Another crucial
point to consider when determin-
ing the viability of client/server for
large projects is staff expertise.

The client/server world seems
to be more the province of people
migrating up from PCs than those
migrating down from mainframes,
said Kent Felling, president of
Computer Design Professionals,
a consulting firm in Atlanta. "That
makes me uncomfortable. There
are certain considerations that
mainframes will bring to a project
that PC people won't—things like
data protection and validation,"
he explained.

Unfortunately, many of the PC-
oriented client/server develop-
ment groups aggregate this problem
by neglecting to enforce design
methodologies or project manage-
ment disciplines. While this is not
a problem when developing small,
tactical applications, it is an is-
sue with mainstream, mission-

critical systems. Corporate devel-
opers stress the importance of
working from a data model in
which all objects and attributes
have been carefully defined.

Vendors of client/server devel-
opment tools recognize the prob-
lem, and many of them are estab-
lishing links to computer-aided
software engineering (CASE)
products to remedy it. For exam-
ple, PowerBuilder from Powersoft
Corp. can now make use of a logi-
cal data model as the foundation
for applications.

More sophisticated develop-
ment products, such as Smart-
Star's SmartStar Vision and The
ASK Group, Inc.'s Ingres/Win-
dows4GL, offer more intimate
links to CASE tools, which enables
developers to automatically popu-
late a repository from a previously
defined data model.

There is no shortage of tools,
and tool vendors are scrambling to
address the remaining challenges.
Despite some lingering skepti-
cism, most IS managers are eager
to put client/server into practice.
Like Napa County's Longoria,
once a critical project comes along
that can justify the expense, they
are inclined to make the leap. **CS**

Beem is a free-lance writer based in
Santa Barbara, Calif. He specializes in
emerging technologies.

Smoothing out the bumps

Charged with the care and feeding of more
paved roads than any other state in the na-
tion, the North Carolina Department of
Transportation's highway division is one of
the largest construction companies in the world. The
state is nearing completion of its first project—an
on-line highway maintenance program that will auto-
mate the state's road maintenance program and help
keep better track of records.

About 150 workstations were installed at 55 sites,
along with ORG2 data servers to handle local database
processing. A wide-area network connects each local
area network to an IBM 9090 mainframe, where cen-
tralized data resides in a DB2 database.

"Client/server is much more involved than it ap-
pears on the surface," said Tom Runkle, deputy state
controller for information resource management. His
advice? Plan for a "tremendous difference" in support
levels for PCs vs. mainframes, and factor in
extra time to get programmers up to speed. **■**

CONSULTANTS' VIEW

Technological growth makes scalability a key concern

Just about every week, a new client-
based application development system
appears on the market.

This is good news for organizations
that want to begin moving the application de-
velopment process from server- and character-
oriented tools to a graphical client environ-
ment. The benefits of graphical application
development—easier prototyping and iterative
development—are becoming clear to
many developers working with these tools.

But the same qualities that make develop-
ment systems so useful and appealing also
present potential dangers.

An organization moves out of the pilot stage
with these new tools, they
will begin to discover that
many of these tools cannot
scale upward as the size,
complexity and number of users grow. Yet scal-
ability is the one criterion that information sys-
tems management cannot afford to underesti-
mate.

Unfortunately, it is not always easy to judge
how scalable a tool will be without careful in-
vestigation. On the surface, these tools look
very much alike, while under the covers there
are dramatic differences.

Whether a developer begins the development
process with a tool such as Microsoft Corp.'s Vi-

sual Basic or KnowledgeWare,
Inc.'s ObjectView, the initial devel-
opment periods will have much in
common.

Even when an initial pilot proj-
ect has been completed, the differ-
ences may not be apparent. Where
the rubber meets the road is when
business requirements dictate
that an application become more
complex and when large numbers
of developers must work together
to create a large-scale application.
Troubles with scalability can
surface in various ways.

In one case, a
developer who
needed to build
a seemingly

simple application went to a local computer
store, purchased a shrink-wrapped personal
development system and very quickly con-
structed a useful and practical application. But
his glory was short-lived. Managers within the
organization who had started using this applica-
tion soon needed more functionality.

So the developer had a dilemma: move from
Visual Basic's higher level, point-and-click en-
vironment into straight C programming or se-
lect a completely different application develop-
ment system—one that could allow the
application to grow from its simple roots to a
complex data analysis system. While it was



Some of the
fastest
development
tools cannot
make the leap
from small
workgroup to
large, complex
projects.

early enough in the process for this developer
to change to a more robust tool, the situation is
not always so simple.

In another case, a large manufacturing com-
pany decided to begin implementing a client/
server development environment. It began with
a pilot project using a popular PC-based devel-
opment system, which was an excellent choice
for the pilot project.

Problems rose to the surface after the initial
pilot stage, however. Once the production pro-
ject began, the two initial developers were
joined by 30 more assigned to the project.

Because this particular tool was initially de-
signed for small workgroups, it simply did not
have the underlying structure to support as
large a set of functions as the organization
needed. After expending more than \$5 million,
the company is now re-evaluating its tools.

How can you tell how scalable a tool really
is? For starters, talk to other customers who
have used the product in a large-scale develop-
ment environment. Ask the vendor for more
than one reference.

Find out what kind of experience the tool ven-
dor has. If the company has done only small
desktop applications, chances are it does not
have the expertise for large systems work.

Make sure you can articulate your own prob-
lem. Be able to explain—in specific technical
detail—what you're trying to accomplish with
the application. And think ahead about growth
potential. **CS**

Hervitz is president of Hervitz Consulting Group in
Watertown, Mass.

World's Largest Prosecutor's Office Adopts New Information Management System

The Los Angeles County District Attorney's Office is implementing a state-of-the-art information management system to help its 950 prosecutors handle the more than 300,000 adult and juvenile cases it tries each year more efficiently.

Under the direction of newly elected District Attorney Gil Garcetti, the head of MIS for the office, Sherman Trawick, is establishing a shared network that will increase the productivity of the prosecuting staff, enhance management information and increase information sharing with other criminal justice agencies throughout L.A. County.

Trawick reports that the success of the Prosecutor's Information Management System (PIMS) being put in place is largely due to the development of a cohesive team consisting of users, District Attorney Office management, Price Waterhouse Management Consulting Services (MCS) staff and technical staff from both the central County IS department and her IS division.

The combination of teamwork, choosing the right system and technology environment and careful implementation of the new system in incremental phases are the keys to meeting the goals set by the department.

Setting Objectives

The complexities involved in prosecuting cases in a county as large as Los Angeles were overwhelming the old system. The environment in place was comprised of several small systems with the equipment and applications that did not interface, requiring duplicate entry of data. Ms. Trawick notes that "one of our key goals was to provide our users with the ability to do case tracking and court document generation on a single system and eliminate costly and time-consuming duplicate data entry. We needed to improve the user interface, too, what was in place was an antiquated system."

Trawick explained that in addition to an improved user interface, and a timely and inexpensive ad hoc reporting system for management, they wanted to facilitate information sharing "with the rest of the criminal justice community." The DAO was one of the few agencies in L.A. County that could not share data with the other criminal justice groups.

The critical need for such information to flow across the criminal justice system was stemmed because the DAO's systems were "outmoded and our minicomputer hardware had a proprietary operating system." What was needed was a way to "automatically capture important data electronically such as booking information when a defendant is arrested and other critical court events." Along the same line, when the DAO's office files a complaint, that data would be generated electronically for the courts and other criminal justice agencies.

Choosing A Solution

When the scope of the problem was analyzed, the DAO's office set about looking for help to develop a system that could provide timely information across a central office and 40 branch and area locations. It would have to provide the 950 prosecutors with current data on juvenile and adult defendants involved in the 250,000 misdemeanors, 50,000 felonies and 25,000 juvenile cases tried each year. To meet those needs, a

decision was made to develop a client/server system for the unit's operations in order to reduce processing costs and provide added flexibility. The system would also have to continue to serve the office's data and wordprocessing needs.

Choosing The Right Vendor

Once the parameters for the new system were established, the DAO's office issued a Request For A Proposal. After evaluating the vendor's RFPs, the two best were asked to present prototypes of the systems that they planned to build. After the all-day presentations and interviews to insure that the system would not only meet the specified technical demands but could also be implemented successfully, Price Waterhouse MCS was awarded the contract.

Trawick explained that the DAO's office was very impressed by the way Price Waterhouse MCS "integrated data processing and wordprocessing into the system during their prototype presentation. It demonstrated a real understanding of what we wanted them to accomplish. We were convinced that they had the client/server skills required to deliver a system to meet our expectations."



A law clerk at the Los Angeles District Attorney's office prepares a crime scene diagram on his PC workstation.

Designing The System

The first step in designing the system was to gain an understanding of the user's needs. In addition to the operation automation system, Price Waterhouse MCS was confronted with the challenge of designing and implementing three key subsystems -- juvenile, adult and victim/witness programs.

Price Waterhouse's design team worked with the users during the external design phase to understand the operation and streamline it. Trawick reports that "the approach used by Price Waterhouse MCS enabled them to quickly gain a thorough understanding of our business and to make valuable recommendations regarding which procedures to keep, to change and to automate."

One of the keys to designing the system was understanding the similarities and differences between the subsystems. The juvenile and adult operations

both required document generation and case tracking. However, juvenile offenders are assigned a court case number that remains with them throughout their history with the court system and only one minor may be assigned to a case. On the other hand, with adults a new court case number is assigned every time a new case is filed and multiple defendants can be assigned to a case.

Trawick explained that the adult system "will be sending and receiving information from numerous systems used by the courts, probation department and law enforcement agencies, while, for juvenile defendants, we only receive and send data to the Juvenile Automated Index System." She indicated that "this was a far less complex system of information gathering, particularly since there are only nine juvenile offices versus 33 for adults." It was thus decided to implement the juvenile subsystem ahead of the adult.

Trawick added that another reason behind the decision was concern about the readiness of the court system interface with the adult subsystem and writing demands in all the buildings that serve the adult program. At the same, she said, "there are components in the juvenile subsystem that will be reused in the victim/witness and adult subsystems. In effect, we're easing the ultimate implementation of these subsystems while we concentrate our efforts on bringing the first one up."

The design of the application also had to include support for the victim/witness assistance program, which has to be able to access information from both the juvenile and adult subsystems. At this time, although there is a California state system in place that tracks payments to victims and witnesses, other parts of the program are a local responsibility. Local DAO representatives require the ability to check on dates for court appearances, to arrange for transportation needs and other services available to those in the program.

The Technology Environment

Clearly, the system is a complex one, calling for highly integrated network architecture and applications. For example, the architecture for PIMS is fully distributed. The database tables reside in DB2 on an IBM ES 9000 mainframe while the primary application programs are accessed from local file servers. The network architecture consists of Local Area Networks (LANs) connected to the County's Wide Area Router from the mainframe to a file server and then a workstation where processing occurs. Information is then transmitted back to the mainframe for storage. Users are running Lotus Notes on OS/2 workstations in the office locations with servers for databases, print, domain and communications.

Because it is critical that information be available for court appearances, the system designed by Price Waterhouse MCS has a great deal of built-in redundancy to take care of emergencies. For example, selected workstations can operate in a stand-alone mode when necessary to ensure that documents needed for court appearances can be printed even if the mainframe, wide area network and LANs are offline.

Continued on page 39

Some See
Client/Server
Only As
Technology...

Others
As Results



The perceived challenge is not only to get the technology right. With the proper client/server service, your solution will be placed at employees' fingertips — and, best of all, your company will emerge as a competitive force in the marketplace.

At Price Waterhouse Management Consulting Services, we believe successful change is achieved by identifying cultures, processes and systems, corporate strategy, and enabling technologies. We bring proven methodologies and a broad range of tools to implement the right solutions for your business.

We have assisted many top companies, throughout the world, attain successful client/server results. We welcome the opportunity to share our experience with you. To receive a complimentary booklet, "Unleashing the Power of Client/Server Technology," call or write:

James Rafferty,
Price Waterhouse,
Management
Consulting Services,
1251 Ave. of the Americas
New York, NY 10020
(212) 819-5000

Price Waterhouse



Reengineering Operations and Systems Brings Maritz Travel Company Increased Sales And Customer Satisfaction

The combination of organization-wide business process improvement along with state-of-the-art networking and client/server computing is helping the Maritz Travel Company (MTC) achieve higher productivity, enhance its cost effectiveness, increase data integrity and respond to customers faster and more effectively. These changes are the result of an intensive reengineering of its business and systems that began in 1992 with the assistance of Price Waterhouse Management Consulting Services (MCS).

As a result of this reengineering effort, the \$1.3 billion company is moving from a functionally driven organization with multi-layered decision-making to a client-focused team structure. To enable these major organizational changes, MTC is implementing a single, seamless data pathway network where all information driving the business is accessible over individual workstations. Although in the midst of implementation, these efforts are already bringing MTC higher productivity, enhanced cost effectiveness, increased data integrity, and speedier response to customers.

Gearing Change To Business Needs

MTC, challenged by sagging travel demand and increasingly complex customer requirements, recognized that it needed to find ways to enhance its ability to deliver high quality, cost effective group travel. After carefully examining its options, management concluded that fundamental changes to MTC's organization, processes, and technology would be required to ensure its continued leadership in the group travel industry. As a result, it engaged Price Waterhouse MCS to help it examine and reengineer its core business processes and to identify related information technology strategies to support the organization to the year 2000.

After an in-depth analysis of MTC's core services delivery process, including product development, supplier management, sales support and marketing, a joint MTC-Price Waterhouse MCS team recommended that MTC restructure its processes, organization and technology around the client-focused concept. The team identified a need for much stronger systems to leverage the skills that previously had been maintained in the functional organization.

"Handling the movement of 2,000 business travelers to a convention or meeting site requires a high degree of coordination and flexibility," according to Scott Guerrero, Vice President Information Systems at Maritz. "It demands ready access to information, quick turnaround and no dropped balls."

Improving Business Processes

The key to MTC's reengineering challenge was to recognize that the organization must be focused completely on meeting the group travel client's objectives. All efforts that didn't contribute to the central objective of designing, delivering, motivating and satisfying group travel programs had to be eliminated or reduced in priority. Recognizing this, the team focused on making changes that:

- Reengineered the way travel programs were designed and sold to eliminate errors and ensure client satisfaction from the outset

- Flattened the organization by eliminating an entire management layer

- Broke down functional barriers by reorganizing people into client-focused teams

- Reduced coordination and bureaucratic costs among functional groups by cross-training, redefining of job boundaries and locating staff members working on the same project in closer proximity

- Increased individual authority to make decisions that would improve client satisfaction

- Reduced non-value-added activity by streamlining specific processes such as job costing and contract administration

The Technology Solutions

Very early in the process MTC recognized that the radical reengineering solution that was being developed could only be successful if supported by new information technology tools.

The empowered client-focused work teams needed technology to help provide the functional linkage and support roles that traditionally had been provided by the deep functional hierarchy. This required that MTC update its non-integrated platforms and systems that had grown up over the years with integrated systems that would allow work teams to communicate between and among themselves. Guerrero highlighted that problem, noting that "what we had were fragmented islands of information that did not integrate well and required redundant databases with increased data input which led to higher costs and errors."

MTC first focused on developing the underlying communications infrastructure, basing the network on a Sybase database, a Novell Ethernet LAN system, Compaq 486 and Macintosh workstations, Sun

Microsystem database servers and Microsoft Windows desktop applications. While the overall system rollout will take eighteen months to complete, a prototype system is already in operation in Maritz Travel's West Coast Area, according to Guerrero. "Our first objective was to replace our old wordprocessing system with the new spreadsheet and wordprocessing applications and network capabilities. The West Coast group has the ability to access data through the desktop."

Attempting to completely overhaul the IT infrastructure while implementing major organization change has been a big challenge for MTC. "Moving to a new technology requires a great deal of patience," Guerrero notes. "It entails a high learning curve and cultural change. You have to manage change by securing commitment to change, building dedicated teams and communicating to the stakeholders in the process. Accomplish that and you're home free."

A Holistic Approach

Looking back on the project Guerrero believes that "the integration of process and information technology under a single solution has been an important key to improving our performance." Although they are not yet "home free," MTC believes that the improvements already validate their decision to undergo the radical change process. Indeed, after only six months of implementation, MTC has been able to achieve significant productivity improvements. MTC fully expects that when the process and systems changeover is complete, the benefits of the project both in terms of increased profits and improved customer satisfaction will be even greater.

Continued on page 39



Gearing to business traveler needs includes a festive cocktail party for conference participants in a beautifully decorated hotel atrium near St. Louis.

Continued from page 35

World's Largest Prosecutor's Office Adopts New Information Management System

Teamwork

When asked about the success of the project to date, Trawick says, "we are all one team." The collaboration with Price Waterhouse MCS and the users has eased the application design process. There are, she adds, regular meetings in which the users are asked to "review everything we do and incorporate their views into the process. My staff and the County IS people all report directly to the Price Waterhouse MCS team leaders."

Rep Sanders, the Price Waterhouse partner responsible for the program, agrees that much of the success of the project is due to teamwork. "Up front we invested in a substantial amount of training for the users and County technical staff in JAD sessions, analysis techniques and technical skills so that each team member would understand their role and the skills required to carry it out. We have ensured that the DA and the County staff are involved in every major aspect of the project." The goal of Price Waterhouse MCS was to see that there is a transfer of knowledge to the DA's staff so that they will be able to continue to support the system after Price Waterhouse's role is completed.

Trawick pointed out that since her staff had worked on the systems that were being replaced, they were able to call attention to potential problem areas early in the process. The approach, she said, "will help ensure that we are building a system that meets the

user needs while limiting the amount of effort required for expensive retrofits or rework."

Facilitating Change

By working with the users, the implementation of the new system will be far easier. Not only did the team work "hard to ensure that the system meets user needs," Trawick says, "but prototypes were built for all three subsystems thus increasing user familiarity." The advantages of introducing users to new systems well in advance before they are in place and making them an integral part of the process is a time-honored technique for managing change.

Training is also an important part of the change to new systems. Trawick explained that her department's goal was to "make sure that the users are properly trained on the new equipment and the new environment. Our users were familiar with the 3270 character-based system. Now they have to learn how to use a mouse and become familiar with graphical interface. We also needed to teach them how to access the 3270 emulator on their PCs so we can remove their old equipment and begin integrating them into the new system."

This part of the changeover has also created problems. Trawick points out that her staff has more responsibilities now that it has to keep "two antiquated systems on line to support users as they transition to the new system." She added that "supporting every-

one, bringing on new equipment and the LAN environment has been a real hurdle to overcome."

The changeover has not only made difficult demands on the IS department, requiring a somewhat different allocation of internal staff resources, but it has affected users in many ways. For example, in addition to just learning the new system, "selected users have a new role to fill. In the past, they did not have to worry about LAN administration. Now each office has an administrator responsible for security, backups, initial troubleshooting and other LAN administration functions."

Moving Forward

These issues raised in a changeover to client/server environments are not easy for organizations to deal with. They require skills such as those brought to the project by the Price Waterhouse MCS team. Despite the challenges, Trawick says that they will not only have the juvenile portion of the application up and running in the third quarter of 1993, but will have the audit portion on-line by the end of 1994. These will be welcome benefits.

Trawick believes that the new system will help make it possible for the DA's office, faced with substantial budget cuts, to handle a larger workload without increasing staff size. She says they are "providing our attorneys with the ability to improve job performance."

Continued from page 38

Reengineering Operations And Systems Brings Maritz Travel Company Increased Sales And Customer Satisfaction

Group Travel at Maritz - The Ultimate Travel Experience

Imagine sending 10,000 important customers and executives of major corporations to the Olympics over a two week period. Moving thousands of people to hundreds of events, dealing with everything from lost luggage to getting a VIP into the sold-out basketball final - an impossible job? That's what Maritz Travel Company does for a living. MTC specializes in delivering unique and carefully crafted travel experiences for clients who want to make a major impression on their customers and top performers. This involves organizational challenges that would overwhelm even the most experienced manager. For example, when a major manufacturer wanted to give 200 parts distributors a unique tour of Maui, MTC devised an intricate rental car road rally, complete with event checkpoints, special maps and prizes. While the experience was preferable to hiring six tour buses, this precision and creativity doesn't come easily. The sheer volume (over 90,000 travelers a year) and complexity of moving thousands of people to exotic destinations without a hitch places great burdens on MTC's processes and systems. Consequently, MTC is continually looking for new ways to deliver the ultimate travel experience.



MTC's new networking and client/server computing system provides quick response in client programs such as this incentive travel cruise program to Antarctica.

would like prices reduced further.

Financial services: "Based on what we could actually build for the cost of Tuxedo, we would not even come close. It would be roughly an order of magnitude of difference, something like \$100,000 in software licenses vs. \$1 million worth of development."

Expert user: "Part of the reason we left the mainframe world was that things cost so much and in open systems, we could move software from one platform to the other. Tuxedo is one product that we can get on nearly every platform, but I still think it's a bit pricey."

EASE OF USE

Overall, Tuxedo was judged easy to use, although administrators have to climb through levels of complexity beyond what they might encounter with a fourth-generation language.

Retalling: "We found it quite easy to use. There are a couple of areas that we found were not intuitively obvious. One was 'how do you handle errors at places in the Tuxedo bulletin board?'"

Utility: "If you're from a Unix C software development view, you're probably comfortable with it. But it doesn't have the next-generation kind of things we're using to make it really easy to build servers. That's why we're building interface layers on top of it for our developers."

TECHNICAL SUPPORT

Service and support from both USL and its resellers are good, but there are occasional problems when USL is better able to solve a problem than the resellers.

Financial services: "USL has been supportive directly. Our only problem has been with the whole sale-to-retail channel. USL is usually a release or two ahead of everybody else."

Expert user: "We'd originally purchased the product through the retail channels but ended up dealing with USL, because we wanted to get the straight scoop. Often you'll hear one thing from the retailer and something else from USL, and it may be because they were a little out of sync."

ADMINISTRATIVE SUPPORT

The evaluators were least happy with Tuxedo's administrative requirements. A lack of systems management tools plus the complexity of the new environment required substantial learning.

Utility: "It takes a highly skilled person to administer Tuxedo effectively—someone who is a very competent Unix administrator. The Tuxedo capabilities that they grab you today haven't really changed in the last seven or eight years, so it's still rather crude. You cannot deploy it into a data center and have the existing operations people run in it. There is a lack of system management tools."

Retalling: "There are exactly three of us here who know what to do with Tuxedo. The fact that there are so few of us is a reflection that it is relatively tricky to turn this over to the people who handle more standard operations."

EASE OF NETWORKING

Mixing different vendors' hardware platforms on a large homogeneous network was no problem for

USL responds

ANNOUNCEMENT: We have recently changed our pricing methodology from a machine-class pricing scheme to a user-based pricing scheme, which allows end users to pay based on use of the system.

MANAGEMENT TOOLS: Historically, USL has left the administrative and management interfaces as an area for value-added by our OEMs, which have developed quite sophisticated tools for development and management of Tuxedo-based applications. Yet the management tools available today with Tuxedo are not based on state-of-the-art, simple graphical user interfaces. We have worked under way on an application-level interface for administration.

SECURITY: **ANNOUNCEMENT:** USL is developing a feature called "Domains" that will make implementation of very large distributed systems simpler. Domains will allow individually managed Tuxedo Domains to be linked up and participate in a single application.

AN SUMMARY: Tuxedo provides security features today for authentication either through the Tuxedo security mechanism or by plugging in a security server such as Kerberos. USL is improving this area and plans to provide authorization capabilities integrated with Tuxedo that will support the use of access control lists.

Tuxedo users. The evaluators said they do have reservations, however, about using the product in heterogeneous networks that go across bridges and routers.

Utility: "One of the problems I still see with this is that it's still a fully connected network, and in our environment, we don't always want it to be a fully connected network. I think there's some basic scaling issues that they have not addressed in the product."

Expert user: "In terms of features and functionality, this thing works swell if you're on a LAN. But we had some significant issues to go through when we started to put this on a machine 300 miles away

over a T1 [line]. It was a bit more difficult than it needed to be."

SECURITY

The evaluators rated this area low because Tuxedo does not support some commonly used security software, and it does not integrate authentication features.

Utility: "There are basic features lacking. They've only made some cursory attempts to integrate authentication, and there are no real books to do any authorization in the product."

SCALABILITY

Tuxedo proved to be scalable—but not easily so, largely because it requires changes to all the platforms. Some of the platforms are limited by their implementation of Unix.

Retalling: "Adding processors is fine. It's a little awkward, and I do have concerns about the limits of the kernels that we're dealing with. I don't know whether we're going to run into some limits or not, but I believe there are limits to the kernels somewhere. The other problem is that if you increase the size of your bulletin board, you have to change the kernel in every machine, and that can be a problem."

—Compiled by MICHAEL L. WOLFE/STP-PUBLISHER

SITE PROFILES

COMPARISON OF TUXEDO PERFORMANCE WITH OTHER PLATFORMS

	FINANCE	RETAILING	UTILITY	EXPORT
PLATFORMS	IBM, PERIODIC, OR IBM, PERIODIC	IBM	IBM, PERIODIC	PERIODIC
USING PREVIOUS VERSION	YES	YES	YES	YES
NUMBER OF APPLICATIONS	2	2	2	1
NUMBER OF USERS	100	ABOUT 200	700	100
APPLICATION TYPES	INTEGRATED ORDER ENTRY, INVENTORY MGMT, ETC.	MANUFACTURING AND FINANCIAL	CLIENT/SERVER RDP	CUSTOM TRANSACTION SYSTEM

TUXEDO 4.3 FEATURES

- ◆ Runs on more than 20 major platforms including MVS, CICS, OS/2, AIX, VMS, Sun, Windows, DOS, Ultrix and Unix.
- ◆ Newly released gateway allows users to access mainframe data in MVS/DBS databases via TCP/IP.
- ◆ Includes high-performance naming service allowing name access to be transparent to applications users and programmers.
- ◆ Offers multiple application load balancing scheme to optimize performance.

MULTIMEDIA MENU

- From 1988 to 1990, the worldwide market of video products is expected to grow at a rate of 4% to 20%.
- Multimedia hardware and software revenues will grow from \$7.2 billion worldwide in 1989 to \$24 billion worldwide in 1993.
- Expanding a PC for multimedia applications can cost \$200 to \$4,000. Prices for incorporating these into applications are even higher.

Source: Market Research International Corp., Mountain View, Calif.

IBM TECHNOLOGIES unveiled **SCREENPLAY**, a multimedia tool used for recording, editing and playing on-line videos from Sun Microsystems, Inc. SPARCstations running Solaris.

According to the company, ScreenPlay was designed to let corporate workstations create on-line screen videos incorporating sound, animation, drawings and text, as well as information from workstation applications.

ScreenPlay has a graphical control panel that looks similar to a VCR. This control panel helps the user create multimedia presentations with sound, animation, drawings and text.

The application is based on Microsoft Corp.'s AVI format, so ScreenPlay videos can be converted to run under Windows. Workstations running ScreenPlay need have an 8-bit color or gray-scale frame adapter, 16M bytes of random-access memory and a total of 24M bytes of disk space: 4M bytes for installation and 20M bytes for video capture.

The base unit price is \$895 with licensing options available for 100, 500 and unlimited viewers.

IBM TECHNOLOGIES, 2639 Terminal Blvd., Mountain View, Calif. 94045, (415) 940-1061.

SYBASE, INC. has announced **GALEMMOMENTUM 2.0**, the newest release of its object-oriented, multimedia application development environment.

GaleMomentum 2.0 was designed to help create easy-to-use and powerful business applications that combine text, graphics, audio and video with transaction data from SQL databases. Target applications include decision support, interactive product catalogs and command and control systems.

Developers can create, edit and link all forms of multimedia objects, access and manipulate SQL data for Sybase, DB2 and Oracle servers, script applications behavior and deploy application systems.

GaleMomentum 2.0 runs on Unix workstation platforms under Sun Microsystems, Inc.'s Solaris, IBM's AIX and Hewlett-Packard Co.'s HP/UX operating systems.

Pricing starts at \$10,000 for a single developer license.

SYBASE, 6475 Christie Ave., Emeryville, Calif. 94608, (510) 596-3500.

SQL TOOLS

COMPUTER CORPORATION OF AMERICA (CCA) has begun shipping **SELECT SER**, a SQL connectivity tool used to give SQL capabilities to CCA's Model 204.

Select Ser is the newest addition to CCA's Advantage Series, an integrated information management platform and application development package. The Advantage Series allows for interoperability and connectivity Select Ser, along with Horizon, the company's LU62 communications package, allows for peer-to-peer connectivity with Model 204.

Select Ser can integrate with Windows programs through Dynamic Data Exchange, and it provides SQL commands for Windows programming.

Select Ser's five-user license is \$2,875.

COMPUTER CORPORATION OF AMERICA, 4

Cambridge Center, Cambridge, Mass. 02142, (617) 492-8860.

SYBASE, INC. has announced the **SYBASE AUDIT SERVER**, an auditing tool that enhances security and enables the auditing of database activity across the network.

Company officials said the product was designed to give information managers more control over security in database server environments.

Sybase Audit Server validates and authorizes attempts to log into the SQL server system. It also captures and records all database access and allows administrators to easily extract data from the audit database.

The Sybase Audit Server works with Sybase SQL Server and Microsoft Corp.'s SQL Server. Pricing starts at \$2,500.

SYBASE, 6475 Christie Ave., Emeryville, Calif. 94608, (510) 596-3500.

BILLIONS AND BILLIONS SERVED

Unit on-line transaction processing (OLTP) systems revenue is expected to grow from \$1.1 billion in 1982 to \$4.0 billion in 1990

The different between OLTP and other application processing environments is how the system can provide the following:

- Data integrity
- Control
- Reliability
- Performance
- Standardization

The following applications can benefit from the characteristics of OLTP:

- Order entry
- Manufacturing
- Inventory
- Distribution
- Financial accounting
- Reservation

Source: International Data Corp., Framingham, Mass. Design Information Services Group, Dallas, N.J.

ORACLE CORP. has announced its **MICRO FOCUS TRANSACTION SYSTEM VERSION 3.1**, a multiprocessor, multitasking, on-line transaction processing system. It provides a client/server and CICS application program development environment.

According to the company, the engine of the product was designed for scalability, flexibility, speed, CICS compatibility and integration with the Micro Focus Dialog System and non-CICS applications. It provides a high level of data integrity and security either on stand-alone workstations or as part of a client/server environment, company officials said.

Micro Focus transaction systems run under Unix, IBM's AIX, OS/2, DOS, Windows and Microsoft Corp.'s Windows NT. Relational database support includes Informix, Oracle, IBM Database Manager or DB2 for OS/2, Microsoft SQL Server, XDB and Gupta Corp.'s SQL Base.

Micro Focus Transaction System Version 3.1 costs \$1,250 for the first copy.

ORACLE CORP., 3445 East Bayshore Road, Palo Alto, Calif. 94303, (415) 856-4161.

HEWLETT-PACKARD CO. has introduced its **HP ESCIN/9000** and enhanced its **HP ESCIN/9000** two software products that process transactions across multiple computer systems and databases.

HP Escin/9000 is a transaction manager that provides data integrity in distributed on-line transaction processing environments. HP claims to be the first vendor offering these products for its own systems in combination with the

tools and utilities to make applications easier to develop and deploy. The transaction manager is compatible with the HP 9000 Series 800 and the HP Apollo 9000 Series 700.

The vendor also enhanced its HP ESCIN/9000 product to include replicated security, enhanced scalability and new management and development utilities. These features help users deploy enterprise-wide Distributed Computing Environment (DCE) applications.

The HP Escin/9000 server products start at \$3,800. Client licenses start at \$150, with monitor licenses priced from \$5,500. The DCE core services are \$1,500. The DCE client licenses start at \$305.

HEWLETT-PACKARD, 3000 Hanover St., Palo Alto, Calif. 94340, (415) 857-1501.

NEC CORP. has improved its **NEC REP DCE** to provide mainframe functionality for client-server environments. This open, distributed transaction processing monitor allows the integration of existing applications with applications running under open systems environments.

NCR Top End controls message distribution and manages resources to provide an enterprise-wide on-line transaction processing system.

This product is available on the NCR System 3000 series and the Hewlett-Packard Co. HP 9000 series machines.

Pricing for NCR Top End starts at \$2,700.

NCR, 1700 South Patterson Blvd., Dayton, Ohio 45478, (513) 445-5000.

WINDOWS APPLICATIONS

IBM'S STREAM FLEX SOFTWARE rolled out its **STREAM FLEX INVENTOR**, a human resources application that allows application runs under Windows on the desktop, with SQL/Server database from Microsoft Corp. and Sybase, Inc. running on HP/UX and DO/UX platforms.

HR Stream Flex Benefits includes open enrollment and full modeling capabilities that allow employees to create and model their own benefit plan. The application can also download information from any human resources system to a workstation. This permits users to define limits of coverage, sources and costs.

HR Stream Flex Benefits pricing starts at \$88,000.

IBM SOFTWARE, 3445 Peach Tree Road NE, Atlanta, Ga. 30326, (404) 239-2000.

DCE SERVER KIT

ATHEUS TECHNOLOGIES has released its **MULTIUSER COMMON SYSTEM SERVICES (DCSS) KIT**, a Distributed Computing Environment (DCE) application server kit for developers of distributed applications.

DCSS is a set of DCE-based applications with features including SQL query functions, distributed access control and generic notification.

DCSS includes sample application programming interfaces and Distributed Access Control Manager Service, under which servers are given the ability to control access to protected resources.

DCSS Server Kit is priced from \$5,100 for a 20-node net to \$160,000 for a site license.

ATHEUS TECHNOLOGIES, 5000 Plaza of the Lake, Suite 275, Austin, Texas 78746, (512) 328-8777.

NOTES UTILITY

NOTESVIEW SYSTEMS SOLUTIONS INTERNATIONAL, INC. has introduced **NOTES UTILITIES** for use with Lotus Development Corp.'s Notes Release 3. The utilities include Usage/Reporter, Replication/Reporter and Design/Monitor. The vendor has also released Notes mail utilities that include Time/Delivery Agent as well as Vacation/Agent.

Usage/Reporter and Replication/Reporter generate reports of Notes database and server activity and database replication histories across a network. Design/Monitor reports on changes in the design of Notes applications on any Notes server.

Time/Delivery Agent allows users to specify when a Notes mail message will be sent. Vacation/Agent allows users to automatically send an acknowledgment that the message was received, but there will not be a response until the user is back in the office.

The Usage/Reporter and Replication/Reporter cost \$895 per server, and the Design/Monitor is \$690. The mail utilities come bundled for \$490.

NOTESVIEW SYSTEMS SOLUTIONS INTERNATIONAL, 5125 Cedar Valley Drive, Suite 207, Westlake Village, Calif. 91362, (818) 961-0200.

ORACLE

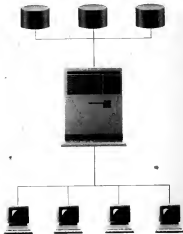
Multi-Server Database Environment

In most organizations, information is distributed across multiple computers. This distribution of information can make accessing that information very difficult.

First Generation Client/Server Database

Applications built using a first generation client/server database cannot access data residing on more than one server computer without a lot of extra programming. In technical terms, a first generation client/server database does not support a standard SQL query or update transaction accessing data on more than one server computer.

Single Server Limit



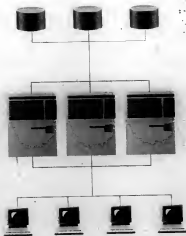
SQL Query and Update can Access Data on One Server Only

Cooperative Server Database

A cooperative server database is different from a first generation client/server database because it enables applications to access data located on multiple server computers just as if all the data were stored on a single server. That is, with a cooperative server database, a simple SQL query or update transaction works identically, regardless of whether the data is stored on one computer or on multiple computers. No extra programming is required.



Multiple Servers



SQL Query and Update can Access Data on Multiple Servers

Reliable, Fast, Low Cost

A cooperative server database simplifies application building and improves decision making by providing easier access to information distributed across multiple servers.

A cooperative server database running on a group of server computers offers high reliability because there is no single point of failure as there is when there is only one server in the configuration. And a group of low-cost server computers can easily outperform a database running on the largest mainframe. Specifically, the Oracle7[™] cooperative server database has been certified as supporting over 10,000 users running more than 1,000 tpcA transactions per second on a pair of low cost UNIX computers. As a matter of fact, Oracle7 has recorded the fastest tpcA performance numbers ever recorded on IBM, DEC, NCR, Sun, Sequent, Pyramid, and HP.

ORACLE

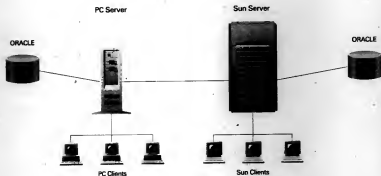
Multi-Vendor Database Environment

Many organizations have networks made up of different types of computers: PCs, workstations, minicomputers and mainframes. The data on these computers is often stored in different types of databases from different vendors. This complexity can make it difficult to access and share information.

Portable Database

The Oracle7 cooperative server database is portable. That is, it runs on PCs, Macs, workstations, minicomputers, mainframes and massively parallel computers. This portability gives organizations the option of running the same database software on different types of computers.

Any Client Can
Access Data on
Any Server



A single SQL query or update transaction can access data distributed across a Netware PC server running Oracle, and a UNIX Sun server running Oracle.

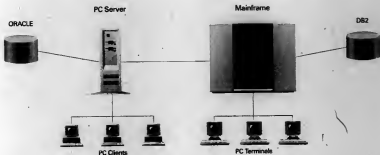
If your organization chooses this option, it is very easy for applications to access data stored on a network made up of different types of computers. For example, an application can retrieve or modify data distributed across a PC server and a Sun server just as if all the data were stored on a single computer.



Open Gateways

However, most organizations have data stored in different types of databases from different vendors. An open database solves this problem by providing applications with easy access to data stored in multiple vendors' databases. Oracle7 has gateways that allow applications to seamlessly access data stored in IBM's DB2, DEC's Rdb, Microsoft's SQL Server, and any other database. These gateways allow applications access to non-Oracle data in exactly the same way and with the same ease as if all the data were stored in an Oracle7 database. For example, Oracle7's gateways enable a simple SQL query or update transaction to retrieve or modify data stored partially in an Oracle7 database residing on a PC server, and partially in a DB2 database residing on a mainframe.

**An Open Database
Enables an Application
to Access Data Stored in
Different Vendors'
Databases**



A single SQL query or update transaction can access data distributed across a Netware PC server running Oracle and an IBM mainframe running DB2.

The Oracle7 cooperative server database is both open and portable. This enables applications to access data stored in different types of databases on different types of computers just as if all the data were stored in one database on one computer. In this way, a cooperative server database hides network complexity, making access to distributed information easier.

Nobody can deliver a client/server solution as quickly or as efficiently as Oracle. We're ready to help you capitalize on client/server computing. We'll send you "Client/Server Database: Getting It Right" by programmer-productivity expert Stephen Schurr. Call 1.800.633.1071 ext. 8125.

©1991 Oracle. Oracle is a registered trademark and Oracle7 is a trademark of Oracle Corporation. TPC Benchmark is a trademark of the Transaction Processing Council.

ORACLE

NO TROUBLE FOR TRIBBLE



◆ **GUY TRIBBLE:** It takes a while to 'get it' with OOP

In one of the classic *Star Trek* episodes, "The Trouble with Tribbles," the Starship Enterprise is overrun by lovable furry creatures that multiply at an alarming rate. Now imagine all those Tribbles as objects proliferating on company networks, and meet a different kind of Tribble: Guy "Bud" Tribble, vice president of end-user software at SunSoft, Inc. Once headed for a medical research career in neurophysiology, Tribble veered off course when a friend persuaded him to join a start-up called Apple Computer, Inc. He became one of the original software developers for the Macintosh and later a key architect of Next, Inc.'s NextStep operating system.

CSI Why did you move to Sun, Next's archrival?

TRIBBLE I ended up becoming very interested in Sun's direction, which has always been aimed at solving the problems of distributed computing. From the start, Sun was focused on using the network as the computer.

CSI Do you believe NextStep will be successful on the Intel Corp. platform, or will PC users find it too complex?

TRIBBLE Whatever that answer is, it's probably the same one for Solaris [Sun's Unix operating system]. There's a real challenge there. If any of these [32-bit advanced desktop operating] systems are going to be widely deployed on lots of desktops, we clearly have to get to the point where the user's main job is not learning how to use the computer.

CSI What about programmer retraining in object technology? Doesn't that present a fairly steep learning curve for most MIS organizations?

TRIBBLE It's very analogous to the time when people programmed in Assembly language. They had to then learn Fortran or Cobol as a higher level language, and there's definitely training involved. But once you go through that, the productivity increase is tremendous.

It takes a while to 'get it' with object-oriented programming [OOP]. You can take someone from the procedural world and teach them OOP, but the first programs they write will still look and feel procedural in style. You won't get the benefits of the higher level language until you make the mind shift.

CSI Is there a simple way to envision that mind shift?

TRIBBLE Imagine that you're cooking a cake. You can make it from scratch, from a recipe, by assembling a list of ingredients and following the directions step by step. That's procedural programming. In the object-oriented world, you don't think about cooking as a sequence of steps.

You think about it as a package of cake mix, a cup of water, a bowl and an oven. It seems to be pretty obvious what you do with those elements.

CSI How does object technology tie into client/server computing?

TRIBBLE It ties in with the productivity increases that will come from network-transparent programming. If I want to write a client/server application today, I have to write it using Sockets or RPCs [remote procedure call] or one of a variety of very low-level networking protocols. It's not transparent at all. In the object-oriented paradigm, my program is made up of messages that get sent between objects, so having that application become a distributed application is much easier.

CSI What do you think of the current state of object-oriented tools?

TRIBBLE Most of those are still in their infancy. On the other hand, I don't think the major benefit for object-oriented programming will necessarily come through the tools. They will make life better but they won't cause the paradigm shift that hinges about an order of magnitude change in productivity.

CSI What will cause that?

TRIBBLE That's going to come with the switch from procedural to object-oriented programming. The developers themselves will drive this issue. When you start seeing examples of deployed applications that get to market that much faster, or MIS shops able to satisfy their CIOs that much quicker, then you'll find that the process of acceptance will accelerate.

CSI Do you have any advice on buying object-oriented tools today?

TRIBBLE Consider the C++ language a foregone conclusion at this point. Also, think about how the object-oriented computing you're doing fits into networked applications. Keep up with the Object Management Group's [OMG] work, and watch for standards compliance with OMG.

CSI How does Sun differentiate itself from the other vendors — such as Apple, IBM and Microsoft — in object technology?

TRIBBLE It's a matter of being that client/server distributed computing is an important center of gravity. [Those companies] have not chosen to concentrate on distributed computing as being central to their paradigm.

— Interview by DAVID R. HARRIS

Just what
you'd expect
from the
leader in
UNIX systems.

Leadership.



The
HP 9000
family.

Our new HP9000 Midrange Business Servers, incorporating SMP and uniprocessor enhancements, deliver over twice the performance of our current systems. They also maintain outstanding price/performance from low- to high-end. Along with top-rated service and support. For more information, call 1-800-637-7740, Ext. 7577. And take the lead.

Think again.



**HEWLETT
PACKARD**

UNIX is a registered trademark of UNIX Systems Laboratories Inc. in the U.S.A. and other countries. © 1991 Hewlett-Packard Company. HP9000 9000-800701N



Hewlett-Packard's open computer systems reach across 72 countries to help ITT Sheraton pamper their guests. While keeping the lid on costs.

"Beyond providing state-of-the-art hardware platforms, HP assumed a partnership role in helping us achieve our strategic business goals."

— Lawrence W. Hall, Director, Hotel Systems
ITT Sheraton Corporation

ITT Sheraton's highest priority is to provide the most personal and efficient hospitality service in the world. That means helping all 450 of their hotels use and share information better. Including detailed advance knowledge about each guest who has stayed anywhere in the ITT Sheraton chain.

Hewlett-Packard helped ITT Sheraton fulfill their vision of a single integrated property system. A system that combines ECI's property management software and ITT Sheraton's reservation system with what have proved to be the perfect hosts — HP 9000 UNIX® Business Servers. With low cost of ownership, scalable range of systems and global support, HP has delivered a world of value.

To check us out, call 1-800-637-7740, Ext. 7447 for a case study. It proves you can shell out less than you think for a gem of a system.

Think again.



**HEWLETT
PACKARD**